GUAM WATERWORKS AUTHORITY

Gloria B. Nelson Public Service Building
688 Route 15
Mangilao, Guam 96913
Phone: (671) 300-6058 Fax: (671) 647-2621

**August 2, 2019**

Edwin J.C. Reyes
Administrator
Bureau of Statistics and Plans
Guam Coastal Management Program
P. O. Box 2950
Hagåtña, GU 96932

Subject: Notice of Authorization that Brown and Caldwell may act on behalf of the Guam Waterworks Authority for services pertaining to State Revolving Fund Grant Project Support

Bueñas yan saluda Mr. Reyes,

Through Work Authorization 2014-11 between the Guam Waterworks Authority (GWA) and Brown and Caldwell (BC), BC is authorized to perform services that support GWA in the development, reviewing, project and construction management, scheduling, and tracking of State Revolving Fund (SRF) Grant supported projects.

Incorporated within these tasks, BC is responsible for making sure that the necessary permits, which are required for many of these projects to progress, are obtained. Therefore, BC is authorized, on behalf of GWA, to submit this Federal Consistency Application for GWA's Southern SSES Rehabilitation – Phase II (Baza Gardens, Santa Rita, Talofofo) Project.

Additionally, please submit any questions regarding this application to Joseph Claveria, EIT, Project Manager at jclaveria@brwncald.com.

If you have any questions or concerns regarding the authorization of BC, please contact me through either phone at (671)300-6036, or by e-mail at thomas@guamwaterworks.org.

Si Yu'us Ma'ase,

Thomas Cruz, P.E.
GWA Chief Engineer

cc: John Riegel, P.E., Brown and Caldwell

Guam Coastal Management Program
RECEIVED
10/1/2019
845am

RECEIVED
SEP 30
BUREAU OF
STATISTICS AND PLANS

414 W. Soledad Avenue
Suite 602
Hagatna, Guam 96910

T: 671-300-4227

September 27, 2019

Brown AND Caldwell

Edwin J.C. Reyes
Administrator
Bureau of Statistics and Plans
Guam Coastal Management Program (GCMP)
P.O. Box 2950
Hagåtna, GU 96932

VIA HAND DELIVERY AND ELECTRONIC MAIL

Subject: Federal Consistency Certification Application:
Guam Waterworks Authority Southern SSES Rehabilitation – Phase II (Baza Gardens-Santa Rita-Talofofo); GWA Project No. S15-001-EPA

Dear Mr. Reyes,

On behalf of the Guam Waterworks Authority (GWA), Brown and Caldwell (BC) submits the enclosed Federal Consistency Application for the Southern SSES Rehabilitation – Phase II (Baza Gardens-Santa Rita-Talofofo) project.

Although this project has previously attained a Federal Consistency Determination from your agency in 2016 (See Attachment 1), certain project events have transpired since then that resulted in a significant change in the nature of work. Because of these events, GWA will be constructing a new wastewater lift station at the end of Lemai Dr. in the Hyundai Subdivision of Santa Rita. As part of this lift station, GWA is intending to construct a portion of the associated force main through a wetland. To proceed with the construction of this force main through the wetland, GWA is applying for a Nationwide Permit (NWP) 12 with the United States Army Corps of Engineers (USACOE), which requires a Consistency Determination that the proposed undertaking complies with the enforceable policies of the GCMP.

Additionally, because this project is funded by the United States Environmental Protection Agency (USEPA; Category III Consistency Determination was attained in February 2016), the National Environmental Policy Act (NEPA) will be conducted prior to the commencement of design and construction activities. This process will ensure that project related activities conform with local agency requirements.

Lastly, an Archaeological Monitoring and Discovery Plan (AMDP) that was developed by a previous contractor under a separate project and submitted to the Guam State Historic and Preservation Office is provided in Attachment 4. Although this AMDP was conducted under a separate contract, the plan contains archaeological information pertaining to the current project's area of concern (referred to as "AG-103" in the plan). This AMDP is provided in Attachment 4 as reference for the GCMP and other local agencies to whom this application will be circulated. It is anticipated that similar archaeological mitigation strategies that are outlined in the attached AMDP will be adopted and followed by the current project contractor.

414 W. Soledad Avenue
Suite 602
Hagatna, Guam 96910

T: 671-300-4227

We understand that your office may circulate this consistency certification among local government agencies that may be affected by the proposed activity. A timely response to this request for certification of compliance would be greatly appreciated as construction for the southern sewer rehabilitation is critically needed and is desired to be constructed in early 2020 during the dry season.

If you should have any questions, please feel free to Joseph Claveria, Project Engineer, at either (671) 300 – 4227 or via e-mail at jclaveria@brwncald.com.

Very Truly Yours,
**Brown and Caldwell**

John Riegel, P.E.
Senior Program Manager

Attachments (3)

1. Attachment 1 – Project Description
2. Attachment 2 – Federal Consistency Review and Concurrence for FC2016-001 Guam Waterworks Authority Island-Wide Sewer Rehabilitation
3. Attachment 3 – Guam Coastal Management Program Assessment Form
4. Attachment 4 – Final AMDP Plan

cc: Tom Konner, USEPA
Miguel C. Bordallo, P.E., General Manager (GWA)
Thomas F. Cruz, P.E., Chief Engineer (GWA)
Vangie Lujan, GWA Senior Regulatory Analyst (GWA)
Joseph B. Claveria, EIT, Project Engineer (BC)

GUAM WATERWORKS AUTHORITY
"Better Water. Better Lives."
Gloria B. Nelson Public Service Building
688 Route 15, Mangilao, Guam 96913

**August 2, 2019**

Edwin J.C. Reyes
Administrator
Bureau of Statistics and Plans
Guam Costal Management Program
P. O. Box 2950
Hagåtña, GU 96932

Subject: Federal Consistency Certification Application:
Southern SSES Rehabilitation – Phase II (Baza Gardens, Santa Rita, Talofofo)
Sewer Lift Station.

Hafa Adai Mr. Reyes,

Please find the attached Federal Consistency Application for the Guam Waterworks Authority's (GWA) Southern SSES Rehabilitation – Phase II (Baza Gardens, Santa Rita, Talofofo) Project prepared by Brown and Caldwell (BC).

Under Section 307 of the Coastal Management Act (CZMA), non-federal activities that are conducted under Federal licenses or permits are subject to review by the Government of Guam to insure consistency with CZMA. A Nationwide Permit 12 (NWP) Application will be submitted to the United States Army Corps of Engineers (USACE) for the construction of a sewer force main through a wetland area in the Village of Santa Rita. A 401C Water Quality Certification Application has also been submitted to the Guam EPA for review and approval.

As required by 15 CFR §930.57(b), GWA is submitting the following consistency certification statement:

**GWA certifies that the proposed activity in the Southern SSES Rehabilitation – Phase II (Baza Gardens, Santa Rita, Talofofo) complies with the enforceable policies of Guam Costal Management Program (GCMP) and will be conducted in a manner consistent with such program.**

A timely response to this request for certification of compliance would be appreciated.

If you have any questions or comments, please contact our representative, John Riegel, P.E., Brown and Caldwell, at 671-300-4230 or via email at jriegel@brwncald.com.

Regards,

Miguel C. Bordallo
General Manager

cc: Tom Konner, USEPA
Katy Damico, USACE
Thomas F. Cruz, GWA
Joseph Claveria, Brown and Caldwell

# Attachment 1. Project Description

## Project Description

1. Background

On July 29, 2016, GWA executed a contract for construction services for the Southern SSES Rehabilitation – Phase II (Baza Gardens-Santa Rita-Talofofo) project (GWA Project No. S15-001-EPA). Within this project, a portion of gravity sewer line that was to be rehabilitated due to excessive infiltration and inflow (I/I) is located on a delineated wetland area near the Hyundai Subdivision in the village of Santa Rita. Particularly, under this project, the project contractor was responsible to rehabilitate the Asbestos Cement gravity sewer lines between the following MHs, which are shown in Figure 1 below:

- MH5678 – MH5679
- MH5679 – MH5680
- MH5680 – MH5681

The intended rehabilitation method for this project was Cast In-Place Pipeline (CIPP), which is a trenchless repair method. On March 15, 2018, however, the project contractor informed GWA, through Brown and Caldwell (BC), that the CIPP installation was unsuccessful due to numerous factors, including improper sewer line preparation, and high ground water levels. Because of the failed attempts to install the CIPP liner, portions of the gravity sewer lines between MH5678 and MH5679, and MH5680 and MH5681 (shown in Figure 1 below) have collapsed and have since been out of service. Due to the inability to rehabilitate this sewer segment and in order to maintain the sewer system of the area, the project contractor has installed, and is currently operating, a temporary bypass system between MH5678 and MH5681 to convey flow around the defective sewer segment. It is in the best interest of GWA, and the surrounding community, that a permanent conveyance system (e.g., sewer lift station) be installed.

2. Proposed Solution

Because this sewer line is located on an environmentally sensitive area, the most appropriate solution for the defective sewer segments, in lieu of constructing a new gravity line via open-cut or horizontal drilling, is to design and construct a new sewer lift station. This new lift station will be located near MH8476 at the end of Lemai Dr., Santa Rita and consist of the following components as shown in Figure 2:

1. A pre-fabricated, underground wet well
2. Concrete wall with overhang for pump and electrical control panels
3. Skid-mounted emergency power generator
4. Perimeter fencing
5. Concrete pad for valves
6. Force Main

Note that the dimensions shown in Figure 2 are only estimates and the final dimensions will be determined after the design is completed. This sewer lift station will be designed to a capacity that adequately serves the current wastewater flow and allows for future residential development in the area. The design will also accommodate peak and wet weather flow conditions.

This lift station will convey flow, through a pressurized force main that is approximately 750 linear feet (LF) long, to MH6436 as shown in Figure 1. As shown in Figure 1, a portion of this

force main (about 150 LF) will cross a delineated wetland area. To mitigate environmental effects, the project contractor will use a jointless, flexible pipe for this force main and use the surrounding native soil to backfill the excavated trench needed to lay the force main underground.

Lastly, GWA is currently in the process of recording a new 20-feet wide sewer easement for the lift station facility and force main with the Guam Department of Land Management (DLM). GWA will submit a property map and legal description, when completed, to the DLM for recording.

The project team has consulted with the United States Army Corps of Engineers (USACE) and the Guam Environmental Protection Agency (GEPA) regarding this solution. Both agencies are receptive to this idea and perceive it to be a viable solution given the circumstances.

The original intention of this project, as shown in Attachment 2, received a Federal Consistency Determination in 2016. However, due to the change in nature of this project, a new Federal Consistency Application is being submitted for the Bureau of Statistics and Plans' (BSP) concurrence that the proposed activity complies with the enforceable policies of the Guam Coastal Management Program.

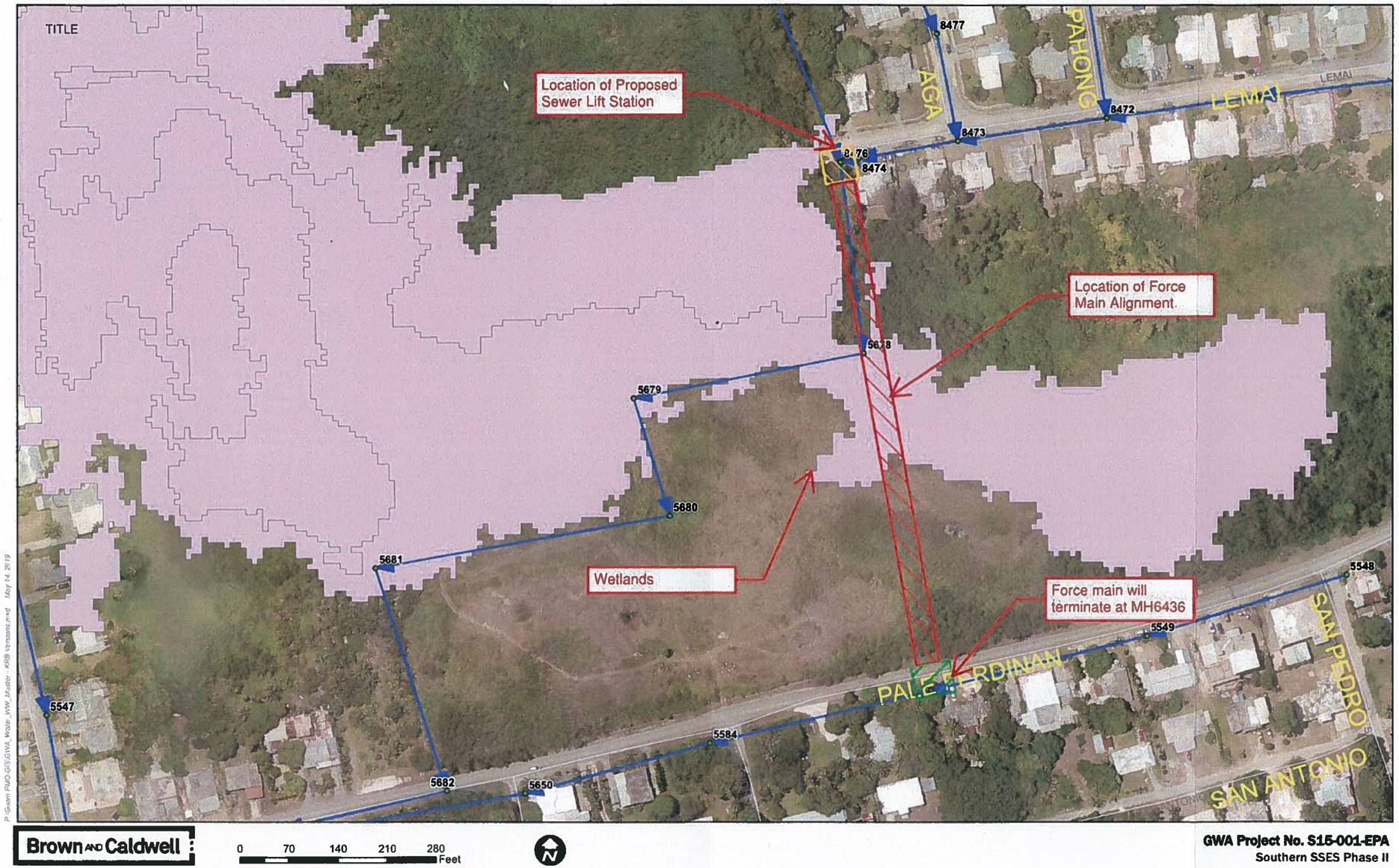


**Figure 1: Lift Station Facility Locations**

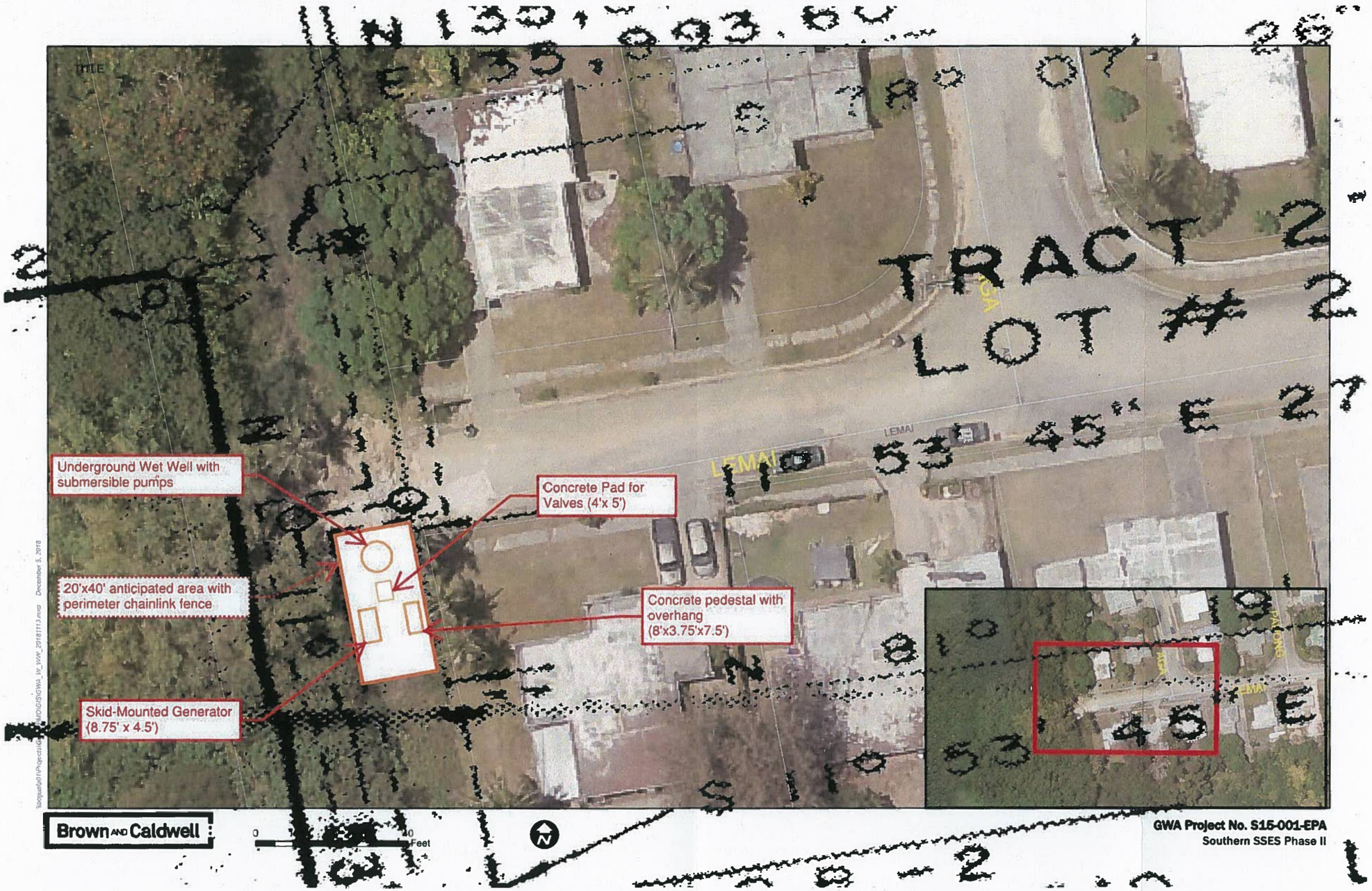


**Figure 2: Lift Station Location with Components**

# Attachment 2. Federal Consistency Review and Concurrence for FC2016-0001 Guam Waterworks Authority Island-Wide Sewer Rehabilitation

**Eddie Baza Calvo**
Governor of Guam

**Ray Tenorio**
Lieutenant Governor

BUREAU OF STATISTICS & PLANS
SAGAN PLANU SIHA YAN EMFOTMASION
Government of Guam
P.O. Box 2950 Hagåtña, Guam 96932
Tel: (671) 472-4201/3
Fax: (671) 477-1812

**William M. Castro**
Director
**James T. McDonald**
Deputy Director

FEB 0 4 2016

William P. Gilman, P.E.
Vice President
Brown and Caldwell
414 W. Soledad Avenue
Suite 907
Hagåtña, Guam 96910

**Subject: Federal Consistency Review and Concurrence for FC2016-0001 Guam Waterworks Authority Island-Wide Sewer Rehabilitation**

Hafa Adai Mr. Gilman,

The Bureau of Statistics and Plans (Bureau) has completed the review of the Guam Waterworks Authority Island-Wide Sewer Rehabilitation project submitted for Federal Consistency concurrence on the following projects.

*Project #1: Southern Sewer Rehabilitation - Phase I (Agat, Santa Rita, Umatac, Merizo).* This project will construct the rehabilitation work recommended in the "Southern SSES Rehabilitation Program" for the Agat Santa Rita area. It will include work to be completed along Route 2, from the area of Route 12 in Agat, south to Pagacaho Drive, as well as some areas around route 12 and 12A. The work areas also include locations in Umatac and Merizo, primarily along Route 4 and within residential subdivisions. The work to be completed includes: the repair and rehabilitation of 27 manholes, with the possible replacement of four of these manholes, and various spot repairs with the possible replacement of approximately 500 linear feet (LF) of sewer line in the Agat-Santa Rita sanitary sewer collection system.

*Project #2: Southern Sewer Rehabilitation — Phase II (Baza Gardens, Talofofo).* This project entails the rehabilitation work for the Baza Gardens-Talofofo area. It will include work to be completed throughout the

Baza Gardens and Talofofo sewer basins, including the area along Chalan Binadu Road. The work to be completed includes the repair and rehabilitation of 31 manholes, with the possible replacement of 3 of those manholes, various spot repairs with the possible replacement of approximately 200 LF of sewer line in the Baza Gardens-Talofofo sanitary sewer collection system.

GWA has identified 31 manholes subject to inflow in this area that need repair and rehabilitation due to either significant fractures or severe deterioration of the concrete within the manhole. GWA has also identified sections of pipelines with severe deficiencies.

*Project #3: Route 1 Asan-Adelup-Hagåtña Sewer Line Rehabilitation and Replacement.* The main gravity sewer pipelines in Route 1, Marine Corps Drive, between Asan and Hagåtña, are experiencing advanced deterioration. There have been a number of identified pipeline collapses which contribute to frequent surcharging in this area, thus limiting the ability to perform CCTV inspections. Existing pipe diameters range from 12 to 30 inches. GWA plans to rehabilitate approximately 13,300 linear feet of pipe along the north-bound lanes of Route 1 from Asan Beach Park to Hagåtña Boat Basin to improve wastewater service and reliability.

*Project #4: Route 2 Agat War in the Pacific National Park Sewer Line Rehabilitation and Replacement.* The main gravity sewer pipeline along Route 2, War in the Pacific National Park, in Agat, experiences sanitary sewer overflows (SSOs) and surcharging, especially during wet weather. Approximately 2,100 linear feet of pipe along Route 2, from the entrance to the Agat WWTP, upstream past the War in the Pacific National Park will be evaluated for any deficiencies related to the SSOs or surcharging.

*Project #5: Route 4 Relief Sewer Line Rehabilitation and Replacement.* The main gravity sewer pipeline along Route 4, Chalan Canton Tasi, in Hagåtña, is currently near full capacity and, at times, experiences SSOs and surcharging, especially during wet weather. There is a secondary, parallel relief sewer pipeline that was installed on Route 4 in the 1990's to help alleviate the amount of flow through the main gravity sewer pipeline, but it was never placed in service and has remained inactive. This project will bring the inactive relief sewer line into service through rehabilitation, repair or replacement.

*Project #6: Tamuning Hotspots Sewer Line Rehabilitation & Replacement.* The purpose of this project is to rehabilitate and/or replace the sewer line around Winner Apartments, Guam Premium Outlets and Segundo Leon Guerrero Street in Tamuning. Rehabilitating and replacing these sections

of the sewer lines will help minimize surcharging and future SSOs in the area, as well as possible I/I.

*Project #7: Tumon Hotspots Sewer Line Rehabilitation and Replacement.* The purpose of this project is to rehabilitate and/or replace portions of the sewer line near the intersection of Pale San Vitores Road and Fujita Road in Tumon. Rehabilitating and replacing these sections of the sewer lines will help minimize future SSOs in the area, as well as possible I/I.

The Bureau's Guam Coastal Management Program (GCMP) has coordinated this review with the Department of Agriculture's Division of Aquatic and Wildlife Resources (DAWR) and provides the following recommendations.

**Water and Natural Resource Protection.** The application states that projects #1 through #7 "will not affect drinking water quality because the repairs pertain to the wastewater system." Although, GWA believes that "it is most likely that the majority of the sewer line repairs will be accomplished via Cured-In-Place Pipelining (CIPP)," an analysis recommending appropriate repair methods from the contractor has not been identified nor provided. Therefore, although the CIPP method is preferred, it is also possible that excavation and trenching are alternate methods in repairing sewer lines.

The Bureau is concerned that construction to repair the sewer lines and leaks associated to these lines will trigger adverse effects on near shore waters including rivers, streams, bays, and groundwater; and terrestrial and marine resources including coral reefs, wildlife, mangrove stands, and wetlands if measures are not in place to manage erosion, sediments, and runoff from construction sites. Controlling sedimentation from construction sites is a priority with regards to stormwater controls and impacts to receiving water bodies within the project site. Therefore, the Guam Waterworks Authority must implement erosion and sediment controls at construction sites for projects #1 through #7 to prevent negative impacts to Guam's natural resources.

GWA is advised to comply with the CNMI Guam Stormwater Management Manual and the Guam Erosion & Sediment Control Field Guide in addition to best management practices (BMPs) established by GWA. GWA is also advised to consult with Guam Environmental Protection Agency (EPA) for effective implementation of stormwater management practices. The following are BMPs that shall be applied by GWA for projects #1 through #7:

1. Mark limits of disturbance to protect waterway buffer, existing vegetation, and other resources.

2. Rivers, streams (ephemeral, intermittent, and perennial), ponds, and wetlands shall be protected by limiting clearing within the riparian corridor (minimum of 25 feet from top of bank, more may be required for steep slopes) and applying perimeter sediment controls between disturbed areas and this riparian corridor. Existing and proposed drainage ways should also be protected by ensuring that flow velocities are non-erosive.

3. Disturbed areas shall be stabilized as soon as feasibly possible after construction is completed within a designated construction area, and in no case longer than 14 days after completion of active construction.

4. Steep slopes shall be protected from erosion by limiting clearing of these areas or, where grading is unavoidable, by using appropriate techniques to prevent upland runoff from flowing down a steep slope and through immediate stabilization to prevent gullying. Applying hydroseed and coir fiber logs on an exposed slope is a helpful technique to quickly establish vegetative cover. A steep slope is defined as any slope over 20% (5:1) in grade over a length of 50 feet.

5. Perimeter sediment controls shall be applied to retain or filter concentrated runoff from disturbed areas to trap or retain sediment before it leaves a construction site. Upland runoff should be diverted around excavations where possible.

6. Sediment trapping and settling devices shall be employed to trap and/or retain suspended sediments and allow time for them to settle out in cases where perimeter sediment controls (e.g., silt fence) are deemed to be ineffective in trapping suspended sediments on-site.

7. Erosion and sediment control practices shall be aggressively maintained throughout all phases of construction. All erosion and sediment control plans shall have an enforceable operation and maintenance agreement to ensure that practices are maintained during the construction process.

A digital file of the CNMI Guam Stormwater Management Manual and the Guam Erosion & Sediment Control Field Guide may be obtained at the GCMP office.

**Fragile Areas.** The application states that the projects are located in existing easements and it is not expected to impact water sources. However, it also identifies that a repair location for Project #1 is located on a wetland in the village of Santa Rita. Wetlands play a vital role in tropical island environments, specifically in Guam's southern watersheds. Guam's wetlands provide habitat for native plants and animals, including the endangered Mariana Common Moorhen.

GWA is advised to consult with the Department of Agriculture's Division of Aquatic and Wildlife Resources and Forestry and Soil Resources Division on matters relating species (plant and animal) of greatest conservation need such as the Mariana Moorhen, known to frequent and nest within Guam's wetlands.

Additionally, GWA is advised to comply with all air and water quality, erosion and sedimentation control standards and other applicable pollution standards as promulgated by the Guam EPA pursuant to §3506 "Standards for Development and Conservation of Wetlands," Chapter 18 Guam Administrative Rules, Article 5 Wetland Areas.

**Historic Preservation.** GWA must obtain concurrence for projects #1 through #7, from the Department of Parks and Recreation, Historic Preservation Division to ensure that the proposed undertaking does not affect historic properties

**Department of Agriculture.** Division of Aquatic and Wildlife Resources provides the following recommendations to GWA (attached):

1. Any clearing of vegetation at project sites will need to be pre-approved by Department of Agriculture's DAWR.
2. When migratory birds are present at the project site, all work is to be ceased until the protected species leave on its own volition.
3. Machinery used at the site must be thoroughly cleaned between project sites to avoid the possibility of spreading invasive species, such as the Little Fire Ant (Wasmannia auropunctata).
4. Silt curtains and soil wetting will be needed during all excavation and trenching activities.
5. Construction debris (including loose sediments) must be cleared and disposed of at a waste facility.

The Bureau also recommends that GWA refer to Department of Agriculture's letter dated September 09, 2015 regarding environmental consultation for Baza Gardens SSES sewer rehabilitation project.

In conclusion the Bureau applauds GWA's efforts to upgrade sewer services for the people of Guam. At the same time we encourage GWA to comply with the points presented above for the protection of Guam's natural resources. Lastly, we concur with GWA's certification that the proposed activities in the Island-Wide Sewer Rehabilitation and Repair projects comply with the enforceable policies of the Guam Coastal Management Program and will be conducted in a manner consistent with such program; and that best management practices will be implemented for all projects listed.

Please do not hesitate to contact Edwin Reyes, GCMP Administrator or Esther Taitague, GCMP Planner for any questions you may have, at edwin.reyes@bsp.guam.gov or esther.taitague@bsp.guam.gov respectively.

Sincerely,

**WILLIAM M. CASTRO**
Director

Attachment

cc: DOAg DAWR
Guam EPA

# Department of Agriculture
# Dipåttamenton Agrikottura

**163 Dairy Road, Mangilao, Guam 96913**

**Edward J.B. Calvo**
**Governor**
**Raymond S. Tenorio**
**Lt. Governor**

| | |
|---|---|
| Director's Office | 300-7965/7966; Fax 734-6569 |
| Agricultural Dev. Services | 300-7973/7972; Fax 734-8096 |
| Animal Health | 300-7965 |
| Aquatic & Wildlife Resources | 735-0294/0281; Fax 734-6569 |
| Forestry & Soil Resources | 300-7976; Fax 734-0111 |
| Plant Nursery | 300-7974 |
| Plant Inspection Facility | 472-1426; 475-1427; Fax 477-9487 |

**Matthew L.G. Sablan**
**Director**

**Jessie B. Palican**
**Deputy Director**


**January 15, 2016**

RECEIVED
JAN 27 2016
BUREAU OF STATISTICS AND PLANS

Mr. William M. Castro
Director
Bureau of Statistics and plans
P.O. Box 2950
Hagatna, GU 96932

**Re: Guam Coastal Management Program Federal Consistency Review for Guam Waterworks Authority Island-Wide Sewer Rehabilitation Project**

Hafa Adai! The Division of Aquatic and Wildlife Resources (DAWR) received your letter dated December 29, 2015, requesting for review and comments regarding the proposed island-wide sewer rehabilitation and/or replacement projects at sever (7) locations. The seven locations identified in the request include:

1. Southern Sewer Rehabilitation – Phase I (Agat, Santa Rita, Umatac, and Merizo)
2. Southern Sewer Rehabilitation – Phase II (Baza Gardens, Talofofo)
3. Sewer Line Rehabilitation, Replacement (Asan-Adelup Hagatna, Route 1)
4. Sewer Line Rehabilitation and Replacement (Route 2 Agat War in the Pacific National Park)
5. Sewer Line Rehabilitation and Replacement (Route 4 Sinajana, Agana)
6. Tamuning Hotspots Sewer Line Rehabilitation and Replacement
7. Tumon Hotspots Sewer Line Rehabilitation and Replacement

Threatened and Endangered species are known to opportunistically occur island wide such as the Mariana fruit bat (*Pteropus m. mariannus*), the Common moorhen (*Gallinula cholorpus*), the Micronesian starling (*Aplonis opaca*), and the Mariana swiftlet (*Aerodramus bartschi*). The Mariana swiftlet has been observed in Baza Garden, Talofofo and Merizo areas within the proximities of the project sites. The Guam tree snail (*Partula radiolata*) is known to occur in the Agana, Asan, and Tumon sites.

As mentioned in the November 12, 2015 letter, the method for repairs will be cured-in-place pipelining and repairs will be performed internally in the sewer line and underground. The letter also mentioned the possibility, if necessary, to excavate or trench depending on accessibility to the existing sewer lines.

DAWR recommends the following conditions at all project sites be implemented:

1. Silt curtains and soil wetting will be needed during all excavation and trenching activities
2. Any clearing of vegetation at project sites will need to be pre-approved by DAWR
3. When migratory birds are present at the project site, all work is to be ceased until the protected species leave on its own volition
4. Construction debris (including loose sediments) must be cleared and disposed of at a waste facility
5. Machinery used at the site must be thoroughly cleaned between project sites to avoid the possibility of spreading invasive species, such as the Little fire ant (*Wasmannia auropunctata*).

DAWR greatly appreciates the opportunity to submit comments and recommendations for the proposed GWA's Island-Wide Sewer Line Rehabilitation and Repair projects. Should you have any questions, please contact Wildlife Biologist, Mr. Jeffrey S. Quitugua, at 735-3996, or via email, at jeff.quitugua@yahoo.com.

Sincerely,

**MATTHEW L.G. SABLAN**

# Attachment 3. Guam Coastal Management Program Assessment Form

## GUAM COASTAL MANAGEMENT PROGRAM ASSESSMENT FORM

Date of Application: September 25, 2019

Name of Applicant: Guam Waterworks Authority

Address: Gloria B. Nelson Public Service Building
688 Route 15
Mangilao, GU 96913

Telephone No.: (671) 300-4227

Title of Proposed Project:
Southern Sewer Rehabilitation - Phase II (Baza Gardens, Talofofo, Santa Rita)

Other applicable area(s) affected, if appropriate:
N/A

Est. Start Date: January 2020 Est. Duration: 7 months

**AGENCY REPRESENTATIVE INFORMATION**

Name & Title: Joseph B. Claveria, Project Engineer

Agency/Organization: Brown and Caldwell on behalf of the Guam Waterworks Authority

Address: 414 W. Soledad Ave., Suite 602
Hagatna, GU 96910

Telephone No. during business hours:
( 671 ) 300 - 4227
Email: jclaveria@brwncald.com

**CATEGORY OF APPLICATION** (check one only)
( ) I Federal Agency Activity
(X) II Permit or License
( ) III Grants & Assistance

**TYPE OF STATEMENT** (check one only)
(X) Consistency
( ) General Consistency (Category I only)
( ) Negative Determination (Category I only)
( ) Non-Consistency (Category I only)

**FEDERAL AUTHORITY FOR ACTIVITY**
33 CFR Chapter II

**OTHER TERRITORIAL APPROVALS REQUIRED**

| Project | Agency | Type of Approval | Application Date | Status |
|---|---|---|---|---|
| Southern Sewer Rehabilitation – Phase II | United States Army Corps of Engineers | Nationwide Permit 12 | Expected October 2019 | Awaiting Biological Assessment for submission. |
| Southern Sewer Rehabilitation – Phase II | Guam EPA | 401 Certification | 08/12/2019 | Expected October 2019 |
| Southern Sewer Rehabilitation – Phase II | Department of Public Works | Building Permit | To be applied by contractor | To be applied by contractor |

**COMPLETE FOLLOWING PAGES FOR BUREAU OF STATICS AND PLANS ONLY:**

DATE APPLICATION RECEIVED:

_____

OCRM NOTIFIED: _____ LC. AGENCY NOTIFIED:_____

APPLICANT NOTIFIED: _____PUBLIC NOTICE

GIVEN:_____

OTHER AGENCY REVIEW REQUESTED:

_____

**DETERMINATION: ( ) CONSISTENT ( ) NON-CONSISTENT ( ) FURTHER INFORMATION REQUESTED**

OCRM NOTIFIED: _____ LIC. AGENCY NOTIFIED: _____
APPLICANT NOTIFIED: _____

ACTION LOG: 1._____
2._____
3._____
4._____
5._____
6._____

**DATE REVIEW COMPLETED:**

_____

**DEVELOPMENT POLICIES (DP):**

DP 1. Shore Area Development

Intent: To ensure environmental and aesthetic compatibility of shore area land uses.

Policy: Only those uses shall be located within the Seashore Reserve which:
- enhance, are compatible with or do not generally detract from the surrounding coastal area's aesthetic and environmental quality and beach accessibility; or
- can demonstrate dependence on such a location and the lack of feasible alternative sites.

Discussion:

This sewer lift station will not impact the environmental and aesthetic compatibility of shore area land uses. The proposed sewer lift station will be located adjacent to an existing Right-of-Way in the Hyundai Subdivision, Santa Rita (Lemai Dr.). The proposed force main alignment, shown in Attachment 1: Project Description, will be buried approximately three (3) feet below ground and will not affect the aesthetic and environmental quality of shore area land uses. Additionally, the force main will be constructed using jointless, flexible pipe, which results in minimal to no required maintenance. The required excavated trench will be filled with the native soil. As a result of this lift station, the wastewater infrastructure will have an increased environmental compatibility due to reduction of inflow and infiltration into the system, and elimination of an existing deteriorated, Asbestos Cement Pipe (ACP) gravity sewer through a wetland.

DP 2. Urban Development

Intent: To cluster high impact uses such that coherent community design, function, infrastructure support and environmental compatibility are assured.

Policy: Commercial, multi-family, industrial and resort-hotel zone uses and uses requiring high levels of support facilities shall be concentrated within appropriate zone as outlined on the Guam Zoning Code.

Discussion:

The scope of this project is not intended to directly result in any urban development and does not include any high-density developments. However, the design of this lift station will consider current and future flows (i.e.., population growth, new residential units) in this residential area, which supports coherent community design, function, infrastructure and environmental compatibility. If multi- or single-family units are constructed in the future within this lift station's service area, this lift station will be able to accommodate the additional flows. This project will improve the neighborhood's sewer system reliability and serviceability for its residents.

DP 3. Rural Development

Intent: To provide a development pattern compatible with environmental and

infrastructure support suitability and which can permit traditional lifestyle patterns to continue to the extent practicable.

Policy: Rural districts shall be designated in which only low density residential and agricultural uses will be acceptable. Minimum lot size for these uses should be one-half acre until adequate infrastructure including functional sewering is provided.

Discussion:

The scope of this project will improve the reliability and serviceability of the existing sewer infrastructure in the Hyundai Residential subdivision in Santa Rita, which is a residential area with approximately 200 homes. Although the design of this lift station considers both current and future flows (i.e., population growth, new residential units) in this area, this project will not directly result in any new rural developments. The dimensions of the lift station, however, will be designed and constructed to accommodate the existing and, allow for, future developments in this area. The installation of the lift station will enable the reduction of the need for one-half acre rural development.

DP 4. Major Facility Siting

Intent: To include the national interest in analyzing the siting proposals for major utilities, fuel and transport facilities.

Policy: In evaluating the consistency of proposed major facilities with the goals, policies, and standards of the Comprehensive Development and Coastal Management Plans, Guam shall recognize the national interest in the siting of such facilities, including those associated with electric power production and transmission, petroleum refining and transmission, port and air installations, solid waste disposal, sewage treatment, and major reservoir sites.

Discussion:

Although this new lift station will serve the Hyundai Residential subdivision, in comparison to other facilities, it is not considered a major GWA wastewater facility. Additionally, this project does not garner national interest since the intent is to enhance and improve the existing sewer infrastructure system in the Hyundai Subdivision in Santa Rita to accommodate current and future wastewater demands in this area. The location of this lift station was selected by GWA due to its engineering (e.g., the entire Hyundai gravity sewer discharges to this location, outside of roadway, etc.) and economic advantages. The preferred force main alignment, shown in Attachment 1, will result in fewer disruptions to the community during construction.

DP 5. Hazardous Areas

Intent: Development in hazardous areas will be governed by the degree of hazard and the land use regulations.

Policy: Identified hazardous lands, including flood plains, erosion-prone areas, air installations' crash and sound zones and major fault lines shall be developed only to the extent that such development does not pose unreasonable risks to the health, safety or welfare of the people of Guam, and complies with the land use regulations.

Discussion:

As mentioned above, the intent of this project is to construct a new sewer lift station and force main in the Hyundai Subdivision in Santa Rita near an existing ROW. This project will not construct any new residential or commercial developments on the island of Guam. Further, the scope of this project is to improve the existing sewer in the Hyundai Subdivision of Santa Rita. To our knowledge, both the lift station and force main alignment are not located in hazardous areas that may adversely affect the health, safety, or welfare of the people of Guam.

DP 6. Housing

Intent: To promote efficient community design placed where the resources can support it.

Policy: The government shall encourage efficient design of residential areas, restrict such development in areas highly susceptible to natural and manmade hazards, and recognize the limitations of the island's resources to support historical patterns of residential development.

Discussion:

As mentioned in DP 2 and DP 3, this new sewer lift station and force main will consider both current and future sewer flows (i.e., population growth, new residential units, etc.) in the Hyundai Subdivision of Santa Rita, which is aligned with efficient community design. The intent of this project is to provide a reliable sewer system with an estimated 50-year service life and allow for additional housing to be constructed in the area.

DP 7. Transportation

Intent: To provide transportation systems while protecting potentially impacted resources.

Policy: Guam shall develop an efficient and safe transportation system, while limiting adverse environmental impacts on primary aquifers, beaches, estuaries, coral reefs and other coastal resources.

Discussion:

This project will not construct or repair existing roadways or highways. The proposed location of the new lift station and force main are outside of existing roadways and will not have a permanent impact on transportation facilities. The selected contractor, however, is still obligated to

implement a traffic control plan that mitigates transportation issues that arise as a result of the work done on or near adjacent roadways. In addition, any impacts to roadways will be restored to the specifications and guidelines established by Guam DPW.

DP 8. Erosion and Siltation

Intent: To control development where erosion and siltation damage is likely to occur.

Policy: Development shall be limited in areas of 15% or greater slope by requiring strict compliance with erosion, sedimentation, and land use regulations, as well as other related land use guidelines for such areas.

Discussion:

As mentioned previously, this project will not create new developments on the island of Guam that will result in erosion or siltation damage. The objective of this project is to construct a new sewer lift station and force main in the Hyundai Subdivision in Santa Rita that allows for additional housing in the area. Construction activities will comply with all appropriate erosion control measures such as, at a minimum, silt fences, which will be used to prevent sediment from entering the adjacent areas. It is anticipated that the installation of both the lift station and force main will occur during the dry season. Furthermore, this lift station will not be located in an area with a slope greater than or equal to 15%.

**RESOURCES POLICIES (RP):**

RP 1. Air Quality

Intent: To control activities to insure good air quality.

Policy: All activities and uses shall comply with all local air pollution regulations and all appropriate Federal air quality standards in order to ensure the maintenance of Guam's relatively high air quality.

Discussion:

As a result of the new lift station and force main, the existing ACP that previously served the Hyundai subdivision will be abandoned in place, underground, to mitigate environmental impacts. This method will eliminate harmful asbestos fibers from entering the atmosphere and posing any health risks to the community. This procedure will be outlined in the project's Best Management Practices (BMP) and implemented by the contractor.

As part of the lift station design requirements, a permanent stand-by generator will be installed and provided. The installed generator will comply with all applicable United States Environmental Protection Agency and Guam Environmental Protection Agency (GEPA) air quality standards.

No significant air pollution will be released by this repair work.

RP 2. Water Quality

Intent: To control activities that may degrade Guam's drinking, recreational, and ecologically sensitive waters.

Policy: Safe drinking water shall be assured and aquatic recreation sites shall be protected through the regulation of uses and discharges that pose a pollution threat to Guam's waters, particularly in estuaries, reef and aquifer areas.

Discussion:

This project will not be conducted in areas that affect Guam's drinking, recreational, and ecologically sensitive waters. It is highly unlikely that this project will affect Guam's drinking water quality as the project location is distant from drinking water sources (e.g., Northern Guam Lens Aquifer, fresh water bodies) and pertains to the wastewater system. However, proper BMPs will be enforced so inadvertent effects that may have an impact to Guam's drinking, recreational, and ecologically sensitive waters (e.g., sedimentation runoff), including the wetland that the proposed force main crosses, are minimized. Additionally, this project will not impact any of the rivers or streams in the area. Collection of wastewater in this residential subdivision is necessary so that it is efficiently conveyed to a wastewater treatment plant for compliant treatment and disposal.

RP 3. Fragile Areas

Intent: To protect significant cultural areas, and natural marine and terrestrial wildlife and plant habitats.

Policy: Development in the following types of fragile areas including Guam's Marine Protected Areas (MPA) shall be regulated to protect their unique character.

- historical and archeological sites
- wildlife habitats
- pristine marine and terrestrial communities
- limestone forests
- mangrove stands and other wetlands
- coral reefs

Discussion:

The project contractor will conduct a Biological Assessment of the project area to determine if federally listed species are present. If it is determined that federally endangered species or habitats are present, GWA and the project contractor will coordinate with the Department of Interior, Fish and Wildlife Service for assistance to comply with the Endangered Species Act.

As shown in Attachment 1, this project will install a force main from the proposed location of the

sewer lift station towards Pale Ferdinand Way in Santa Rita, which is approximately 750 linear feet long. Of this 750 linear feet, 150 linear feet section crosses through a wetland (See Attachment 1 – Project Description). GWA has submitted a 401C Water Quality Permit to the GEPA and will also submit a Nationwide Permit No. 12 application to the US Army Corps of Engineers (USACE). The applied permits identify the procedures GWA, and the project contractor, will implement to protect the water quality in the project work area. Mitigation procedures to protect the wetland will include:

1. Silt fencing.
2. Utilizing native soils to backfill open excavations.
3. Utilizing jointless, flexible pipe for the force main, which minimizes leaks, breakages, and required maintenance.
4. Limiting construction activities during the dry season.
5. Compliance with required BMPs as stipulated by the Federal Consistency Determination, GEPA, and USACE.

Construction of this force main through the wetland will be conducted during the dry season (January – May) so that impacts can be minimized. Although in a wetland area, no waterbodies exist in the immediate vicinity of the project area that are susceptible to contamination.

RP 4. Living Marine Resources

Intent: To protect marine resources in Guam's waters.

Policy: All living resources within the waters of Guam, particularly fish, shall be protected from over harvesting and, in the case of corals, sea turtles and marine mammals, from any taking whatsoever.

Discussion:

With the exception of the small portion of the force main through a wetland, majority of this project is not expected to occur near or around the waters of Guam. During the course of this project, any fish or aquatic lift identified in the wetland will be protected and will not be harvested. Therefore, impacts to living marine resources will be minimal or negligible. This project will not harvest or take any aquatic species.

Further, a biological assessment is currently being conducted to identify any fish and wildlife and to determine any necessary mitigation techniques. Project is not intended to harvest or take any marine or living resources.

RP 5. Visual Quality

Intent: To protect the quality of Guam's natural scenic beauty

Policy: Preservation and enhancement of, and respect for the island's scenic resources shall be encouraged through increased enforcement of and compliance with sign, litter, zoning, subdivision, building and related land-use laws. Visually objectionable uses shall be located to the maximum extent practicable so as not

to degrade significant views from scenic overlooks, highways and trails.

Discussion:

GWA believes that the new sewer lift station is located in an area where Guam's natural scenic beauty is protected and preserved. The lift station will be constructed at the end of Lemai Dr. of the Hyundai Subdivision in Santa Rita. The force main will be buried underground and neither be visible nor affect the visual quality of Guam's natural scenic beauty. Upon completion, areas that were aesthetically disturbed during construction will be restored to its original condition.

The result of this work will not interfere with scenic overlooks, highways, or trails.

RP6. Recreation Areas

Intent: To encourage environmentally compatible recreational development.

Policy: The Government of Guam shall encourage development of varied types of recreational facilities located and maintained so as to be compatible with the surrounding environment and land uses, adequately serve community centers and urban areas and protect beaches and such passive recreational areas as wildlife, marine conservation and marine protected areas, scenic overlooks, parks, and historical sites.

Developments, activities and uses shall comply with the Guam Recreational Water Use Management Plan (RWUMP).

Discussion:

To GWA's knowledge, this sewer lift station will neither be located on nor interfere with Territorial recreational facilities.

RP 7. Public Access

Intent: To ensure the right of public access.

Policy: The public's right of unrestricted access shall be ensured to all non-federally owned beach areas and all Guam recreation areas, parks, scenic overlooks, designated conservation areas and their public lands. Agreements shall be encouraged with the owners of private and federal property for the provision of releasable access to and use of resources of public nature located on such land.

Discussion:

Public access to the island's waste water infrastructure is prohibited. Public access poses safety and security risks that may hinder the system's operation. Further, the location of the lift station will not interfere with the public's right of unrestricted access to all non-federally owned beach

areas and all Guam recreation areas, parks, scenic overlooks, designated conservation areas, and public lands.

The lift station will not be located on a beach area or Territorial recreational area, park, scenic overlook, designated conservation area, or other public land.

RP 8. Agricultural Lands

Intent: To stop urban types of development on agricultural land.

Policy: Critical agricultural land shall be preserved and maintained for agricultural use.

Discussion:

The new lift station will not affect agricultural lands. As stated previously, this project will not result in any urban development. Furthermore, the project is not located in an agricultural zone.

# Attachment 4. Final AMDP Plan (Reference)

Note: This document was completed by a different contractor under a separate project; however, area "AG-103" in this AMDP refers to the general location of this project's lift station and force main. It is anticipated that the current contractor will adopt and follow similar archaeological mitigation techniques that are outlined in this AMDP.

**Eddie B. Calvo**
*Governor*

**Ray Tenorio**
*Lt. Governor*

**Department of Parks and Recreation**
**Government of Guam**
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**Robert S. Lizama**
*Director*

**William N. Reyes**
*Deputy Director*

In reply refer to:
RC2014-1173
C/R: 2014-1043

March 15, 2016

David G. Defant, M.A.
Principal Investigator
Southeastern Archaeological Research, Inc., (SEARCH)
P. O. Box 3636
Hagåtña, Guam 96932

Subject: Review of Final Archaeological Monitoring and Discovery Plan for the GWA Southern SSES Rehabilitation Project, Agat-Santa Rita and Umatac-Merizo, Island of Guam

Dear Mr. Defant:

We have reviewed subject Final Archaeological Monitoring and Discovery Plan (AMDP) and the changes made in response to our letter of January 18, 2016. Previously, during the initial review of the Draft Plan we found that there were several project areas that should have been included in the AMDP. After further consultation with the project contractor, Reliable Builders Inc., two more additional monitoring areas were included as noted in the subject Final Plan.

We are satisfied with the inclusion of the two (2) additional monitoring areas, AG-116 and UM-113; this will concludes our review of the Final AMDP, you may proceed with the GWA Agat-Santa Rita and Umatac-Merizo SSES project.

This is a Section 106 project that is directly associated with the compliance requirements for the GWA's Sanitary Sewer Evaluation Survey (SSES) Based Collection System Repair in response to EPA Region 9 Federal Court Action. All project areas not covered by the ADMP are subject to 36 CFR 800.13 Post review discoveries. If cultural properties are inadvertently discovered during the course of any construction activity, the construction must cease and Reliable Builders Inc. must immediately report the discovery to our office.

Please comply with the reporting guidelines for the submission of the draft technical report including the Archaeological Report Summary Form (ARSF) enclosed. If you have any questions, please do not hesitate to contact our office.

Sincerely,

Robert S. Lizama
Director

Lynda Bordallo Aguon
State Historic Preservation Officer

Cc: Angel Mascarinas
Reliable Builders, Inc.
General Contractor
info@reliablebuildersguam.com
Thomas F.A.Cruz, P.E., Chief Engineer
Guam Waterworks Authority (GWA)
thomas@guamwaterworks.org

# Archaeological Monitoring and Discovery Plan

**GWA Southern SSES Rehabilitation Project, Agat-Santa Rita and Umatac-Merizo, Island of Guam**

*Prepared for:*
Reliable Builders, Inc.
PO Box 7536
Tamuning, Guam 96931

February 2016

# Archaeological Monitoring and Discovery Plan
# GWA Southern SSES Rehabilitation Project, Agat-Santa Rita and Umatac-Merizo, Island of Guam

*Prepared for:*
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February 2016

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# INTRODUCTION

On behalf of Reliable Builders, Inc., and the Guam Waterworks Authority (GWA), SEARCH has prepared this Archaeological Monitoring and Discovery Plan in conjunction with the GWA Southern SSES Rehabilitation Project, Agat-Santa Rita and Umatac-Merizo, Island of Guam. This plan was formulated in compliance with the requirements of Guam Title 21 GCA Chapter 76; Guam Executive Orders 89-9 and 89-24; and requirements of the Guam Historic Preservation Office (GHPO). All archaeological measures implemented during these investigations will be conducted in accordance with the Secretary of the Interior's Standards for Identification and Evaluation (36 CFR Part 66).

## PROJECT BACKGROUND

The proposed GWA Southern SSES Rehabilitation Project involves replacement of sewer line segments and repair of sewer manholes within the Villages of Agat, Santa Rita, Umatac, and Merizo, Guam. According to Reliable Builders, Inc., the replacement of the sewer manholes will not involve any ground disturbance. Consequently, this Archaeological Monitoring and Discovery Plan only involves the sewer line replacements that involve excavation.

In total, there are seven sewer line replacement undertakings anticipated, including AG-103, AG-115, AG-116 in the Village of Agat and UM-106, UM-113, UM-114, UM-116 in the Village of Merizo (**Figure 1**). The average dimensions of these proposed sewer line segments is 16 feet (ft) (4.9 meters [m]) long, 8 ft (2.4 m) wide, and 8 ft (2.4 m) deep.

This Archaeological Monitoring and Discovery Plan includes measures designed to identify and mitigate any impacts to historic properties that may occur during excavations or ground clearing associated with the GWA Southern SSES Rehabilitation Project. These measures include monitoring of the excavations, documentation and evaluation of discoveries, and mitigation of impacts to potentially significant historic properties through the retrieval, analysis, and reporting of archaeological data.

The implementation of data recovery measures will only be employed following consultation with Reliable Builders, Inc., GWA, and the GHPO. All data recovery investigations will be consistent with the US Advisory Council on Historic Preservation's ACHP "Recommended Approach for Consultation and Recovery of Significant Information from Archaeological Sites" and consistent with confidentiality restrictions imposed by the US Archaeological Resources Protection Act (ARPA) and the US National Historic Preservation Act (NHPA).

Mr. David G. DeFant, MA, will serve as Principal Investigator for the monitoring investigations. Mr. DeFant's qualifications exceed the Secretary of Interior's Standards and Guidelines (Secretary of the Interior 1983) for an archaeologist.


**Figure 1. Location of Sewer Line Replacement project areas.**

## PROJECT AREA DESCRIPTIONS

The Mariana Islands are located approximately 2,200 kilometers (km) southeast of Japan, and approximately 6,000 km west of Hawai'i. Guam is the southernmost and largest of the islands forming the Mariana chain. Guam is approximately 50 km long and averages approximately 8 km wide. The total area of Guam equals approximately 560 square km.

The AG-103 sewer line segment is located in an undeveloped portion of Santa Rita north of Route 12A Ferdinan Way, approximately one km east of the Togcha Beach shoreline, and north of the Nama River (**Figure 2**). AG-115 and AG-116 are located on Finile Drive, immediately south of Finile Creek (**Figure 3**). UM-106 is located along Espinosa Avenue in Merizo, just east of the Geus River, and approximately 600 m northeast of Guam's southern coastline (**Figure 4**). UM-113 and UM-114 are located along Quinene Road in Merizo approximately north of Achang Bay shoreline (**Figure 5**). UM-116 is located along the inland side of Route 4, west of the Manell River, and approximately 420 m north of the Balang Point shoreline (see **Figure 5**).

It is anticipated that all seven of the proposed sewer line segments mentioned above have been extensively disturbed by excavation of the existing sewer lines, as well as other twentieth century improvements, including road construction.


**Figure 2. Location of Sewer Line Replacement AG-103 project area.**


**Figure 3. Location of Sewer Line Replacement AG-115 and AG-116 project areas.**


**Figure 4. Location of Sewer Line Replacement UM-106 project area.**


**Figure 5. Location of Sewer Line Replacements UM-113, 114 and 116 project areas.**

# BACKGROUND RESEARCH

The following section of this Archaeological Monitoring and Discovery Plan summarizes contextual data relevant to potential archaeological resources within the project areas. This includes separate summaries of the land use history and previous archaeological investigations, in both the Agat-Santa Rita area and Merizo area.

## LAND USE HISTORY OF AGAT-SANTA RITA PROJECT AREA

The place name of Agat does not appear on the earliest reference to villages of the late seventeenth century on Guam (Garcia 1985). However, reference is made to nearby settlements of Sumay and Orote. The area today known as Agat may have at that time been represented by the village names of Fuuna, Agofan, Tayfac, Unian, or Pupuro (Moore et al. 1995).

The village name of Agat first appears in conjunction with the resettlement of Chamorros following 1695 (Carano and Sanchez 1964). According to Thompson (1942), Agat, along with Asan and Piti, were known as rice-growing districts. The village of Agat slowly grew through the eighteenth and nineteenth centuries. A population of 712 was reported in 1887 (Olive 1984).

**Figures 6 and 7** illustrate the locations of AG-103, AG-115, and AG-116 project areas on a 1902 US Navy map of Guam (US Navy 1902). **Figure 6** indicates a school was located to the west of the AG-103 project area during that period. A 1913–1914 US Army Corps of Engineers map of Guam (Sturdevant 1914) and a 1944 map of Guam (US Army 1944) indicate bull cart paths were present in the vicinities of AG-103, AG-115, and AG-116 throughout the majority of the first half of the twentieth century (**Figures 8 through 11**).

In 1944, the Japanese forces occupying Guam began to fortify possible landing beaches with pill boxes, trenches, and gun emplacements (Denfeld 1997). Denfeld (1997) reports that Ga'an Point was fortified with two concrete pillboxes armed with 75 millimeter (mm) and 37 mm guns. These fortifications were supported by well-hidden rifle and machine gun positions. Command facilities, mortar, and artillery positions were located farther inland and in the foothills above.

On June 16, 1944, US cruisers, battleships, and aircraft initiated intensive Naval and aerial bombardment of Agat (Lodge 1991). Beardsley (1964) estimated that 2,000 rounds of 5 inch shells and 5,000 rounds of 40 mm shells were fired at Agat. The goal of this pre-invasion tactic was to destroy the Japanese gun emplacements and to demolish any buildings or structures that the Japanese could potentially fortify once the ground invasion was underway.

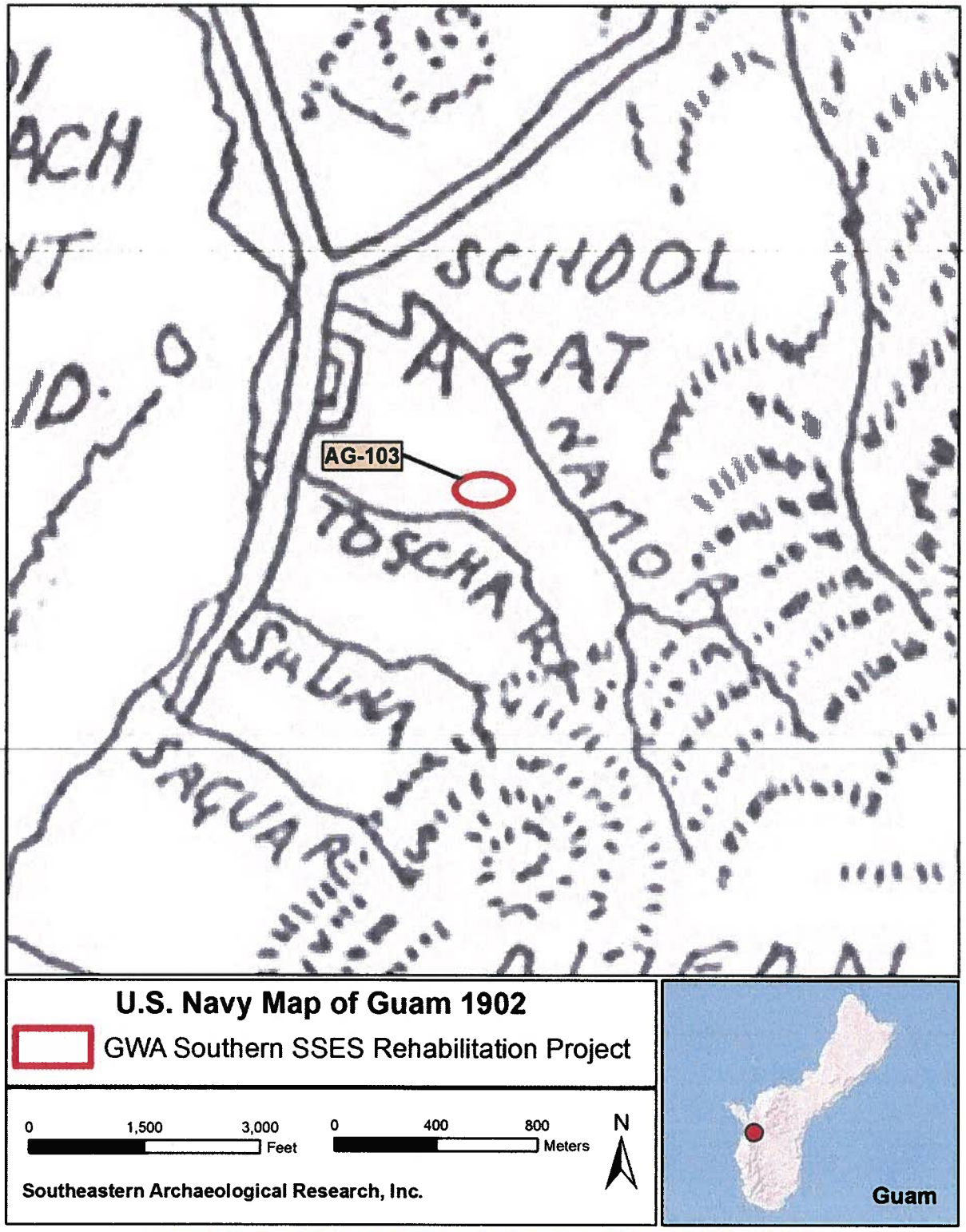


**Figure 6. Location of AG-103 on 1902 US Navy map of Guam (US Navy 1902).**

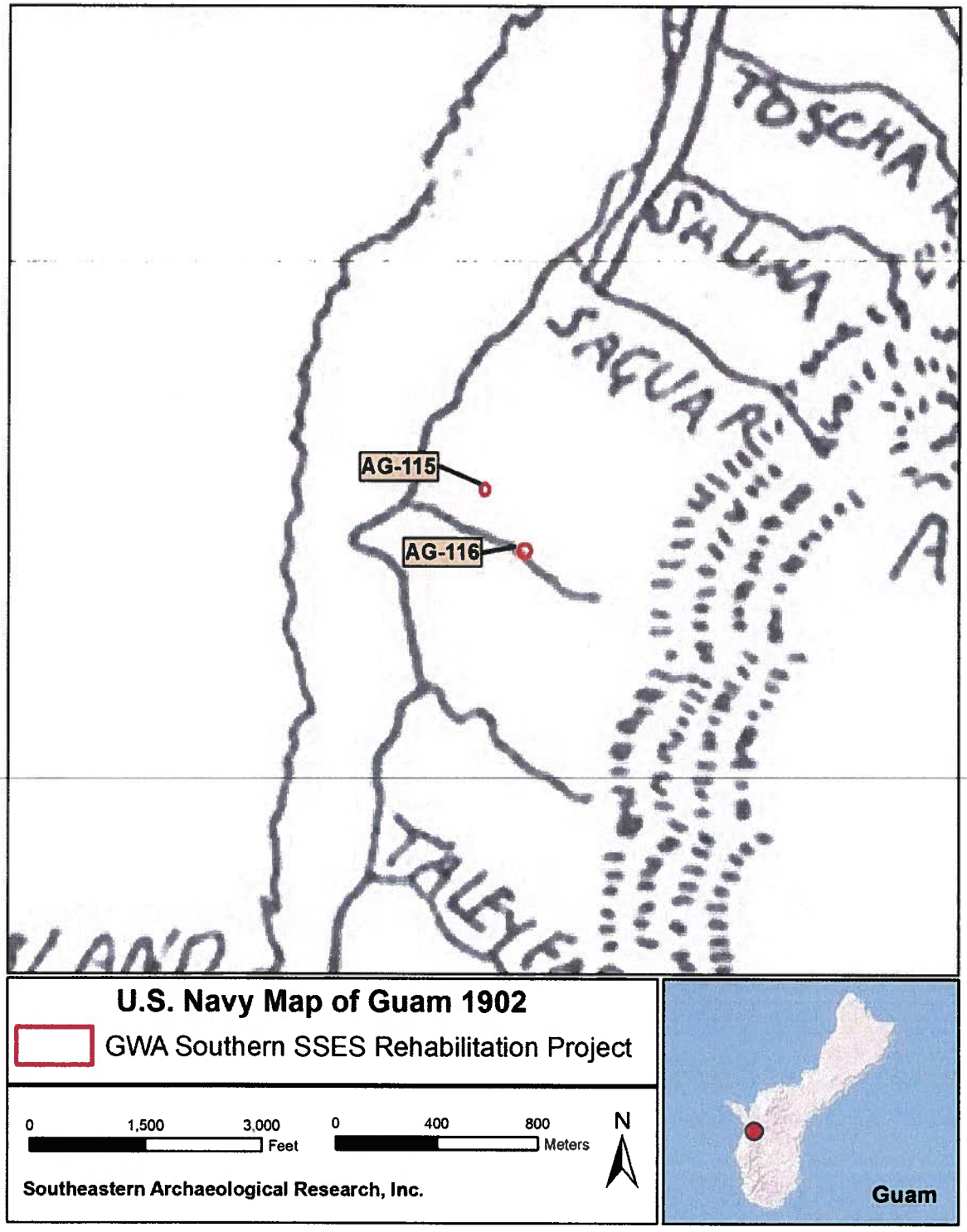


**Figure 7. Location of AG-115 and AG-116 on 1902 US Navy map of Guam (US Navy 1902).**

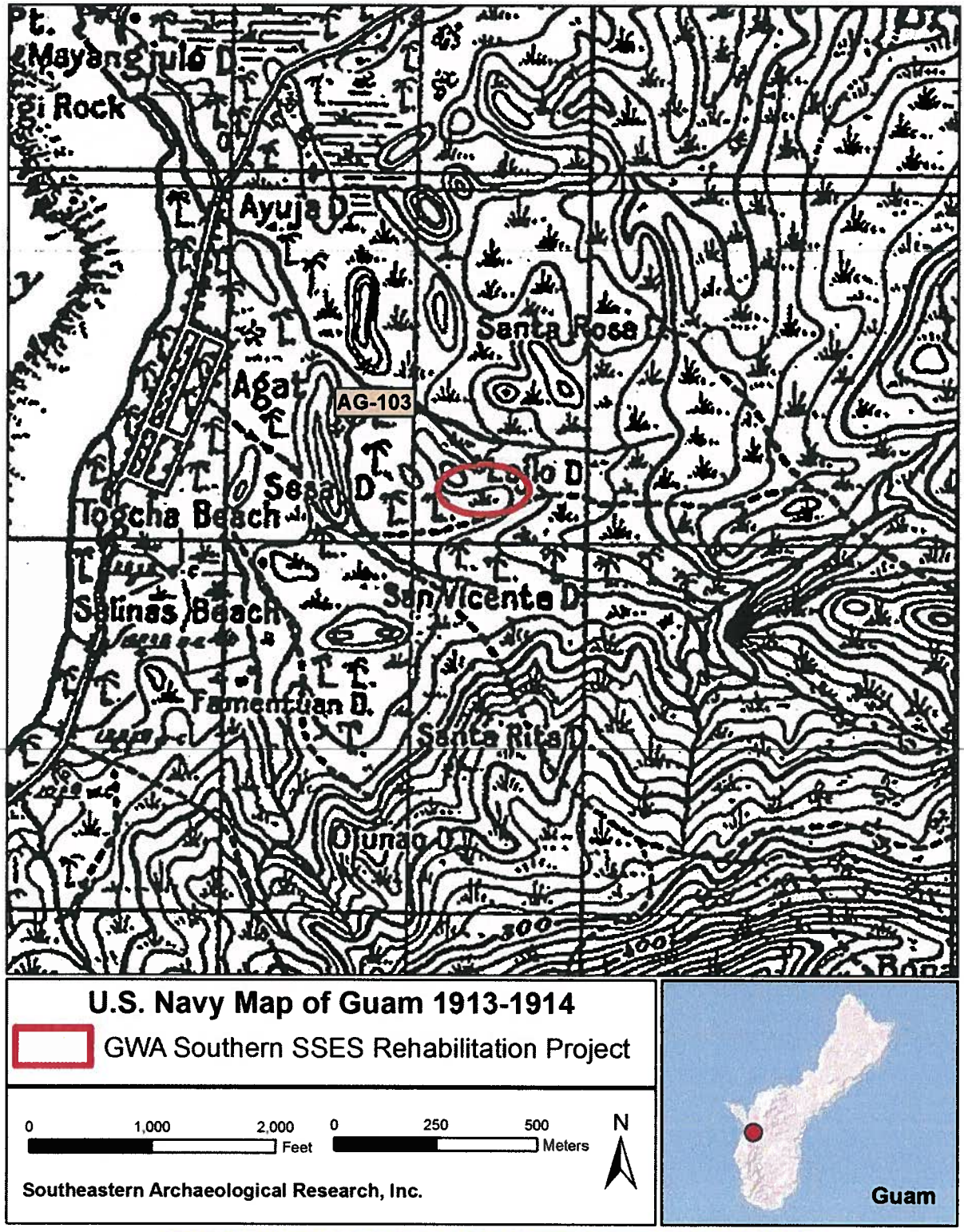


**Figure 8. Location of AG-103 on 1913–1914 map of Guam (Sturdevant 1914).**

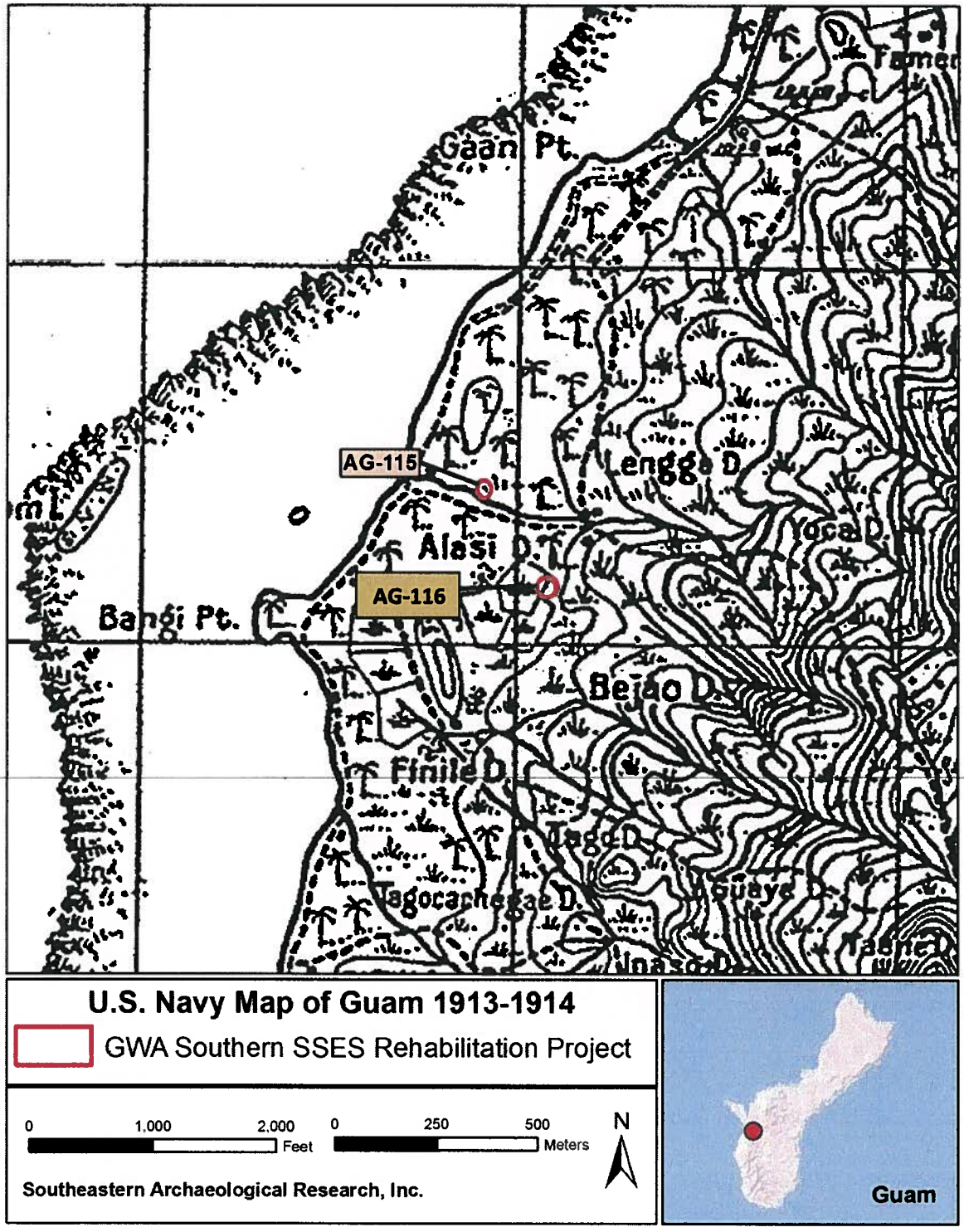


**Figure 9. Location of AG-115 and AG-116 on 1913–1914 map of Guam (Sturdevant 1914).**

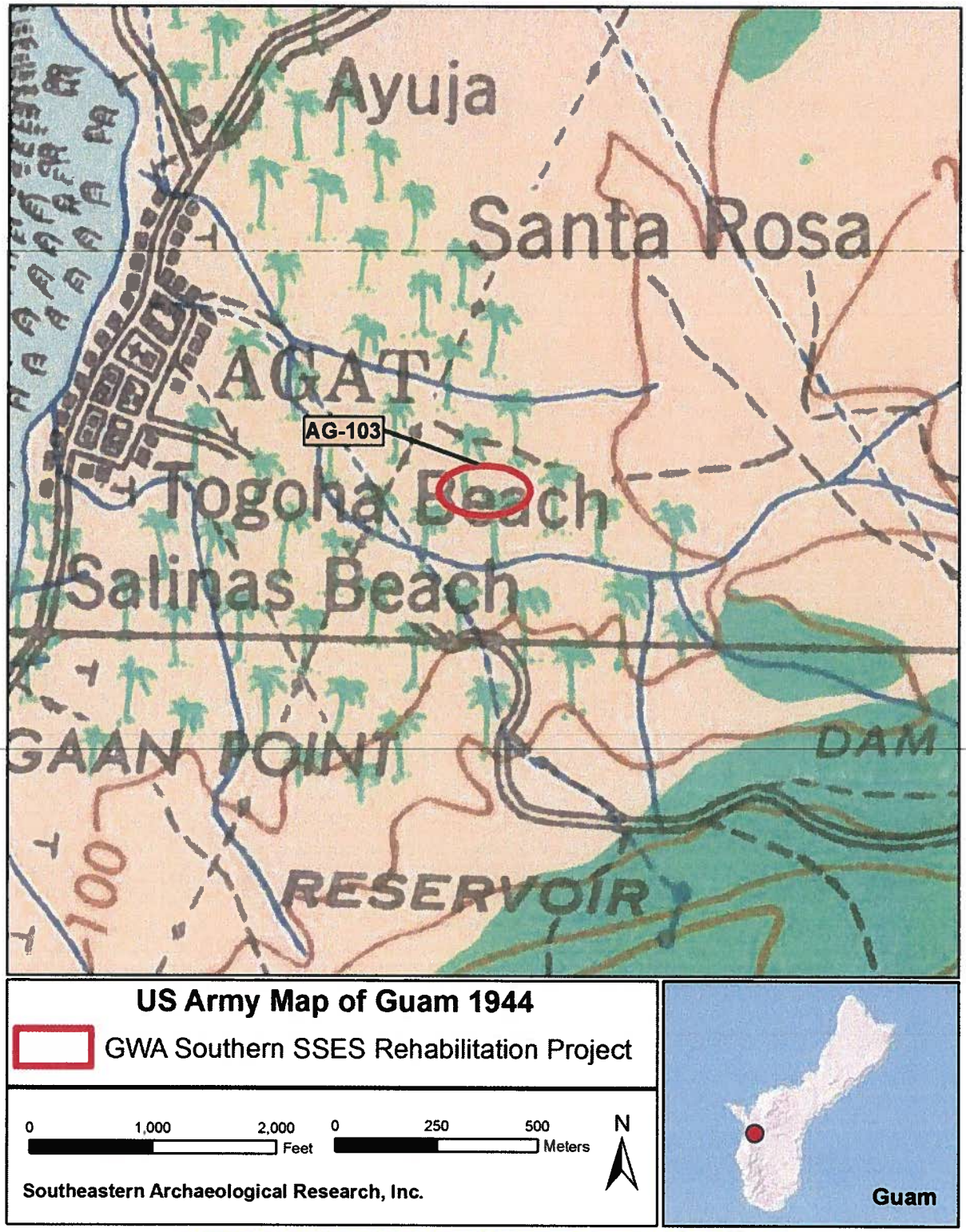


**Figure 10. Location of AG-103 on 1944 map of Guam (US Army 1944).**

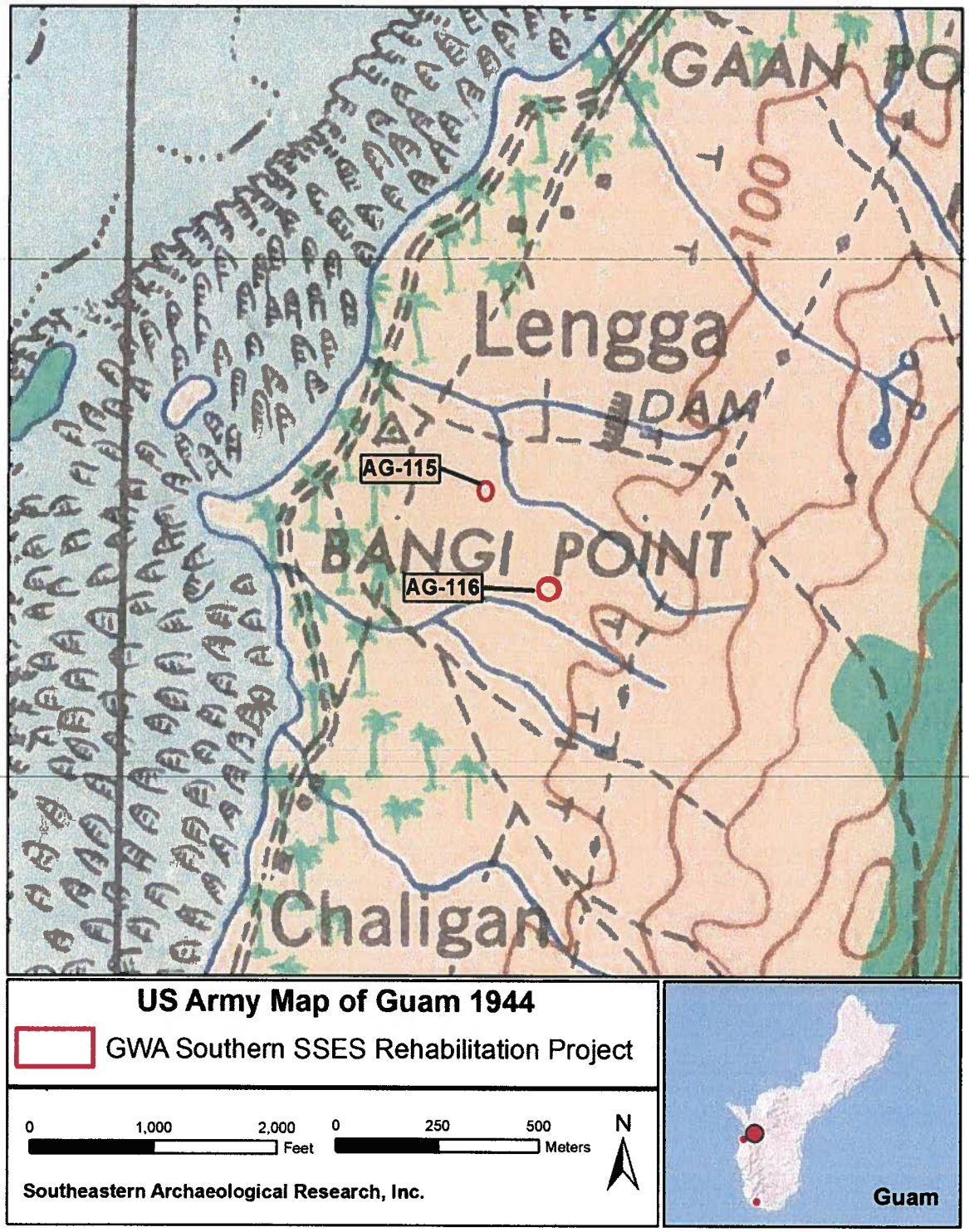


**Figure 11. Location of AG-115 and AG-116 on 1944 map of Guam (US Army 1944).**

On July 21, 1944, American amphibious military forces stormed the beaches in front of Agat Village north of Ga'an Point (Crowl 1985). The Japanese positions on Ga'an point took a heavy toll on the American forces. This position was taken during the first day of fighting when the Marines managed to outflank the Japanese and take Ga'an Point from the rear. Artillery and an 80 mm gun position inland of Ga'an Point continued to batter the American forces until these positions were taken later in the day (Denfeld 1997).

Following World War II, Agat became increasingly developed. A 1954 map of Guam indicates that AG-103, AG-115, and AG-116 were developed by this time (**Figures 12 and 13**) (AAFE 1954).

## LAND USE HISTORY OF MERIZO PROJECT AREA

The arrival of Jesuit missionaries in 1668 began a series of armed clashes between the Chamorros and the Spanish which lasted for 30 years. By the end of the seventeenth century, the Chamorro people had been beaten into submission and congregated into six population centers, one of which was located at Merizo (Jennison-Nolan 1979:6). Sometime later (before 1722) a battery, containing numerous cannons, was constructed in Merizo (Degadillo et al. 1979:53).

In 1690 the Spanish galleon *Nuestra Senora del Pilar de Zaragosa* ran aground on the Cocos Island reef as it tried to make anchorage in Umatac harbor. The *Pilar*, a consort ship for the flagship *Santo Nino*, was transporting Franciscan missionaries, soldiers, and convicts from Acapulco to the Philippines, as well as supplying provisions for Guam (Driver 1988).

According to de la Corte (1971:28), circa 1870 Merizo boasted a church, parish house, and an assembly house (Casa Municipal), all of mamposteria construction roofed with thatch. In addition, there were 34 private homes of matting and betel-nut strip walls with thatch roofs. By 1886 the number of homes had increased to 70 or 80 (Marche 1982:25).

Umatac was utilized as a replenishment stop for Manila galleons throughout much of the eighteenth century. As a result, the area supports a rich assemblage of historic Spanish remains. In his report of a survey of military installations on Guam, Villalobos (1979) mentions four batteries protecting Umatac Bay. These included Fort de Nuestra de la Soledad, Fort de San Jose, Fort del Santo Angel, and Fort Santa Barbara. Villalobos mentions that all were in a state of disrepair and suggested that all but Fort Santa Barbara be abandoned.

Probably the most well known of the Spanish fortifications is Fort Soledad. The fort was constructed circa 1803 to protect Umatac Bay from outside attack. Moore and McNerney (1984) conducted test excavations at Fort Soledad in 1984, primarily focusing on future stabilization and restoration.

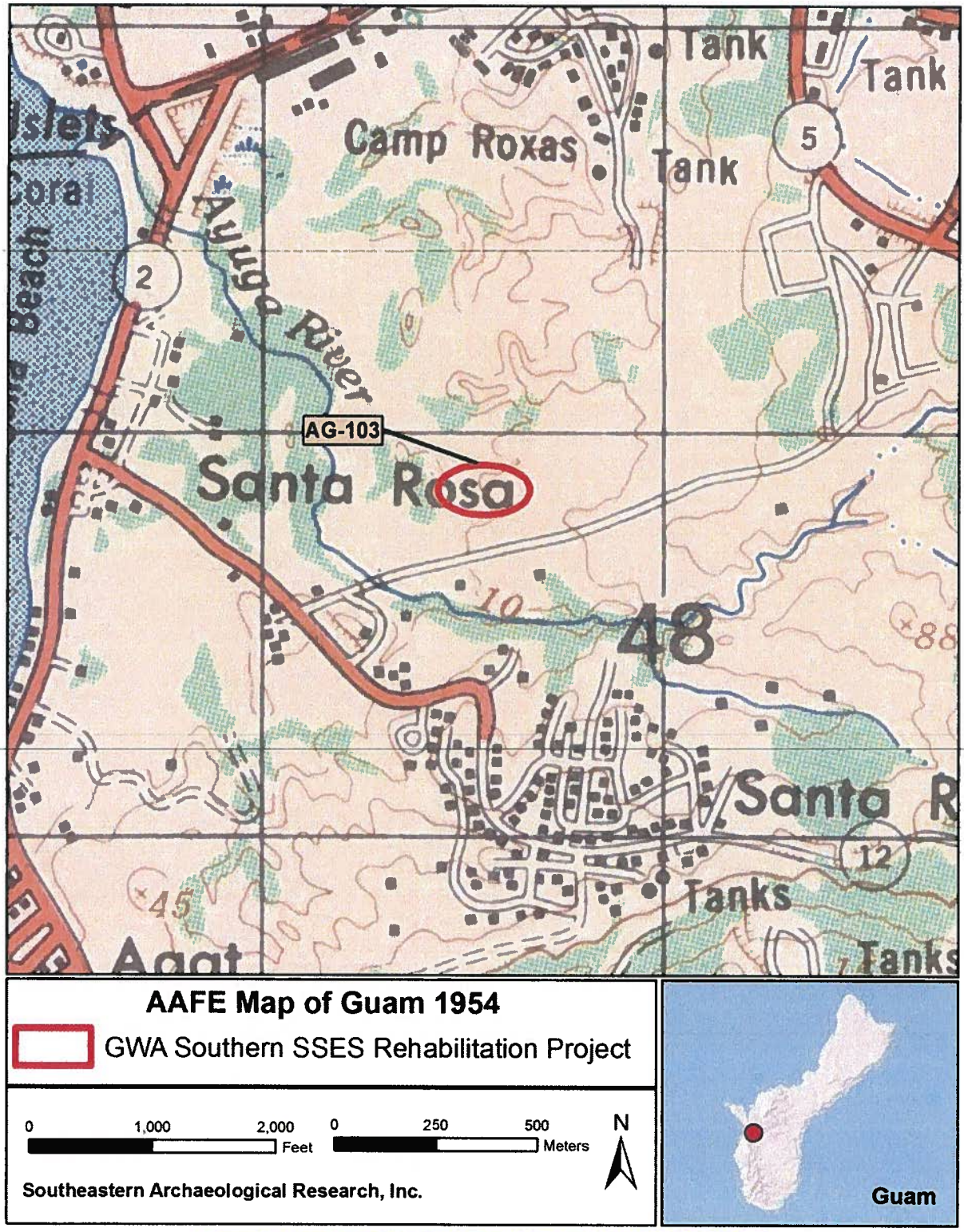


**Figure 12. Location of AG-103 on 1954 map of Guam (AAFE 1954).**

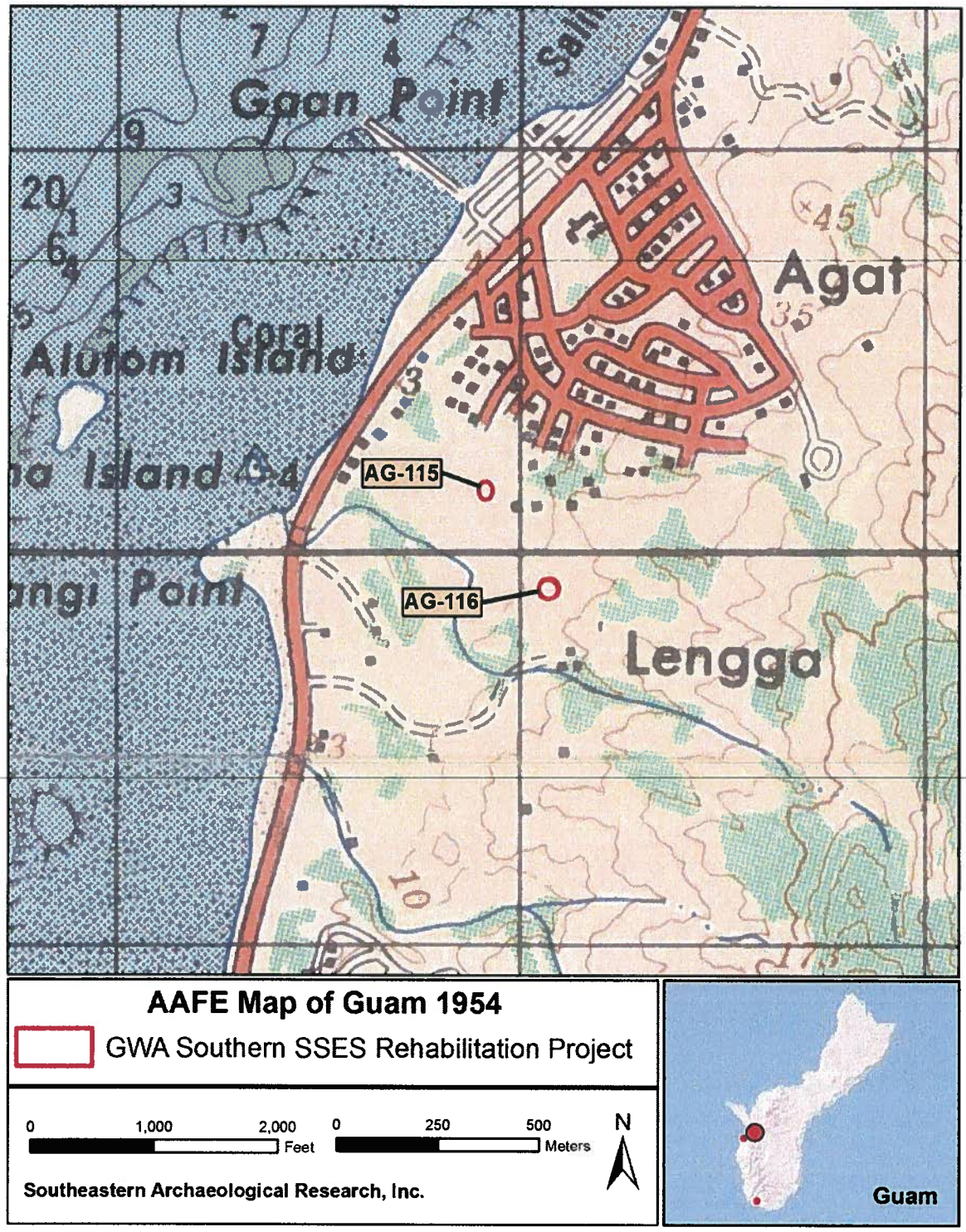


**Figure 13. Location of AG-115 and AG-116 on 1954 map of Guam (AAFE 1954).**

The onset of American administration of Guam had little effect on Merizo beyond the initiation of school and sanitation programs (Stephenson 1979). Merizo village families, in isolation, continued with subsistence practices and bartered for goods (Jennison-Nolan 1979:8).

**Figures 14 through 21** illustrate the location of UM-106, UM-113, UM-114, and UM-116 on historical maps from 1902, 1913–1914, 1944, and 1954. **Figure 14** indicates that the AM-106 project area was located in proximity to the Merizo School in 1902. The 1902 and 1913–1914 maps illustrates a "metaled" (constructed of broken rock) road running through Merizo along the same corridor as modern day Route 4 (see **Figures 14 through 17**). The UM-106 project area appears to have been located along a road indicated on the 1902 map of Guam (see **Figure 14**).

In 1926, Merizo was a prosperous settlement of some 800 people living in 150 huts and several mamposteria houses. Rice was cultivated to the east of the village, coconuts were grown on ranches in the Geus River Valley, and fish caught in the lagoon were sold in Agana (Cox 1926:54). This pattern apparently continued until World War II, by which time a dam had been built about a mile inland on the Geus River to provide irrigation control for the cleared farmland in the river valley (Thompson 1942).

After the Japanese invasion, Merizo villagers dispersed to live on their ranches as Japanese troops occupied the village. The Japanese built a rice mill in the course of their occupation, the walls of which are still present in the village. Towards the end of the occupation, when it became evident to the Japanese that they would have to defend the island, village men and boys were directed in the construction of defensive positions in and around the village. A pillbox near the small boat harbor still can be seen today. Merizo and Umatac escaped the bombardment that saw the destruction of many other villages on Guam before and during the US invasion (Thompson 1942:42). Thus some of the structures in Merizo may be constructed on pre-war foundations (Kurashina et al. 1982:9).

On July 15-16, 1944, a week before US forces invaded Guam, 46 Merizo villagers were herded into two nearby caves (Tinta and Faha) and massacred by Japanese troops (Sanchez 1979). This action resulted in a pre-invasion rebellion led by eight Merizo men on July 20. After overpowering supply depot guards, they armed themselves, attacked the Ataite concentration camp, and liberated the captive Chamorros (Sanchez n.d.). **Figures 18 through 21** illustrate the location of the project areas on historic maps dated to 1944 and 1954, respectively.

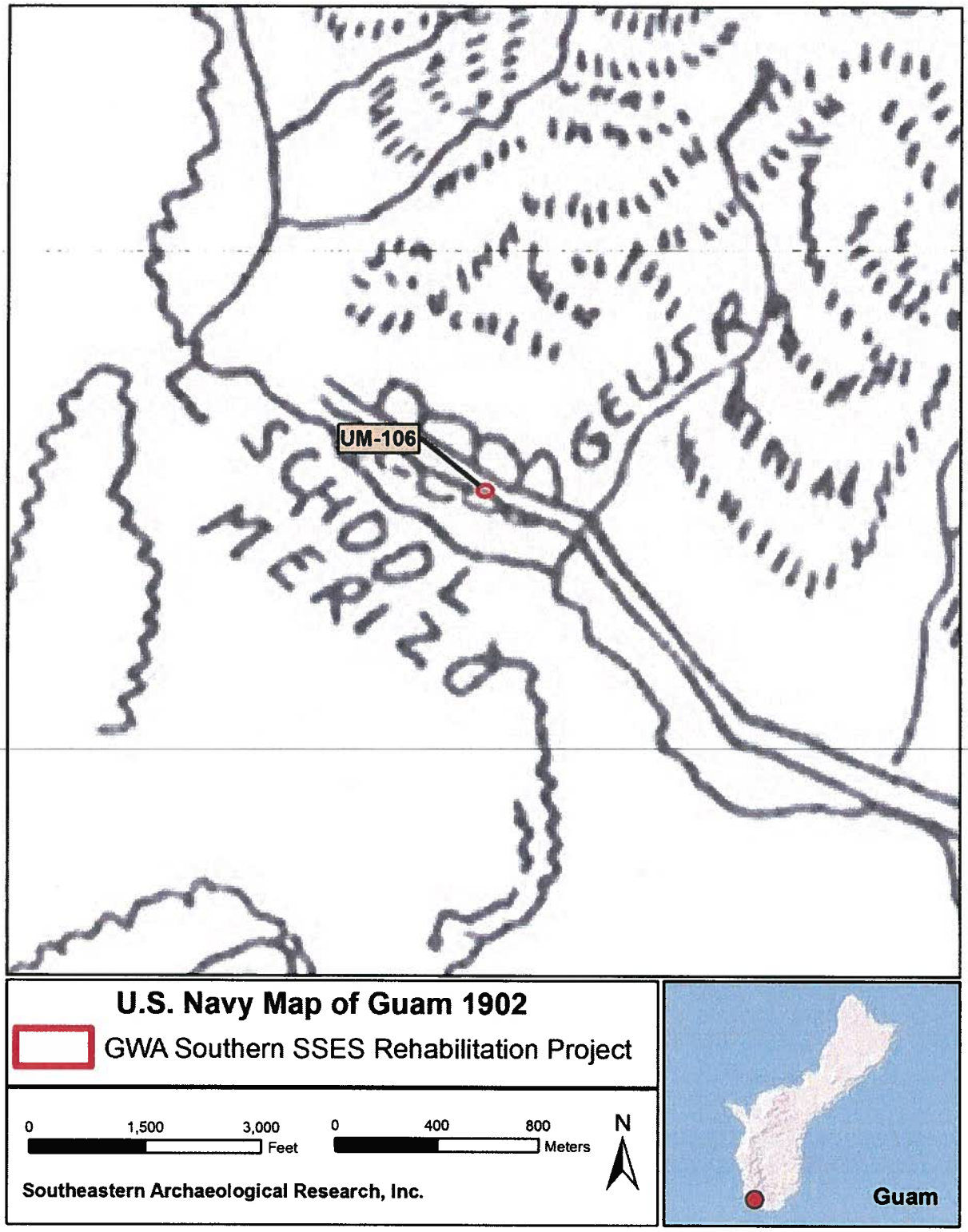


**Figure 14. Location of UM-106 on 1902 US Navy map of Guam (US Navy 1902).**

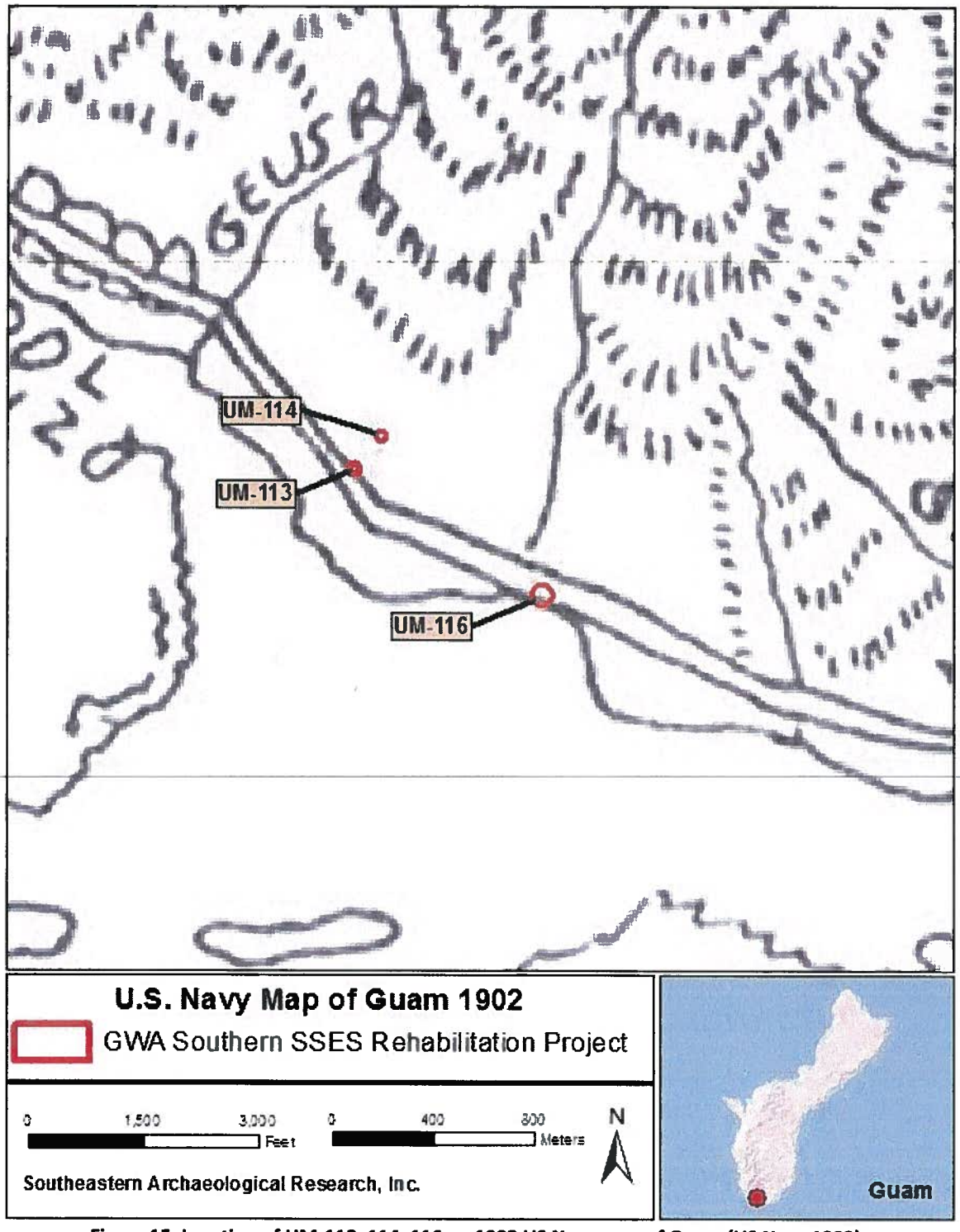


**Figure 15. Location of UM-113, 114, 116 on 1902 US Navy map of Guam (US Navy 1902).**

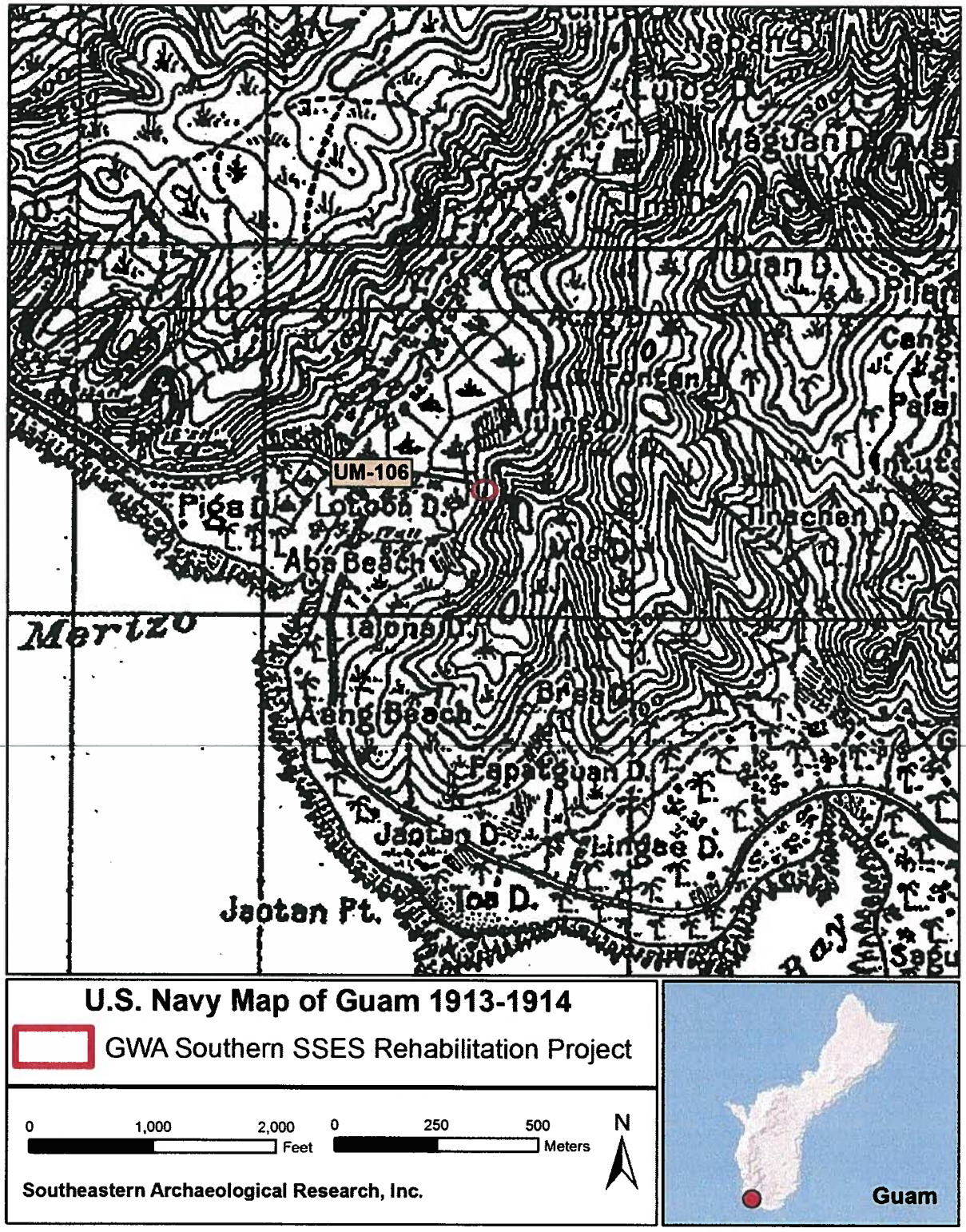


**Figure 16. Location of UM-106 on 1913–1914 map of Guam (Sturdevant 1914).**

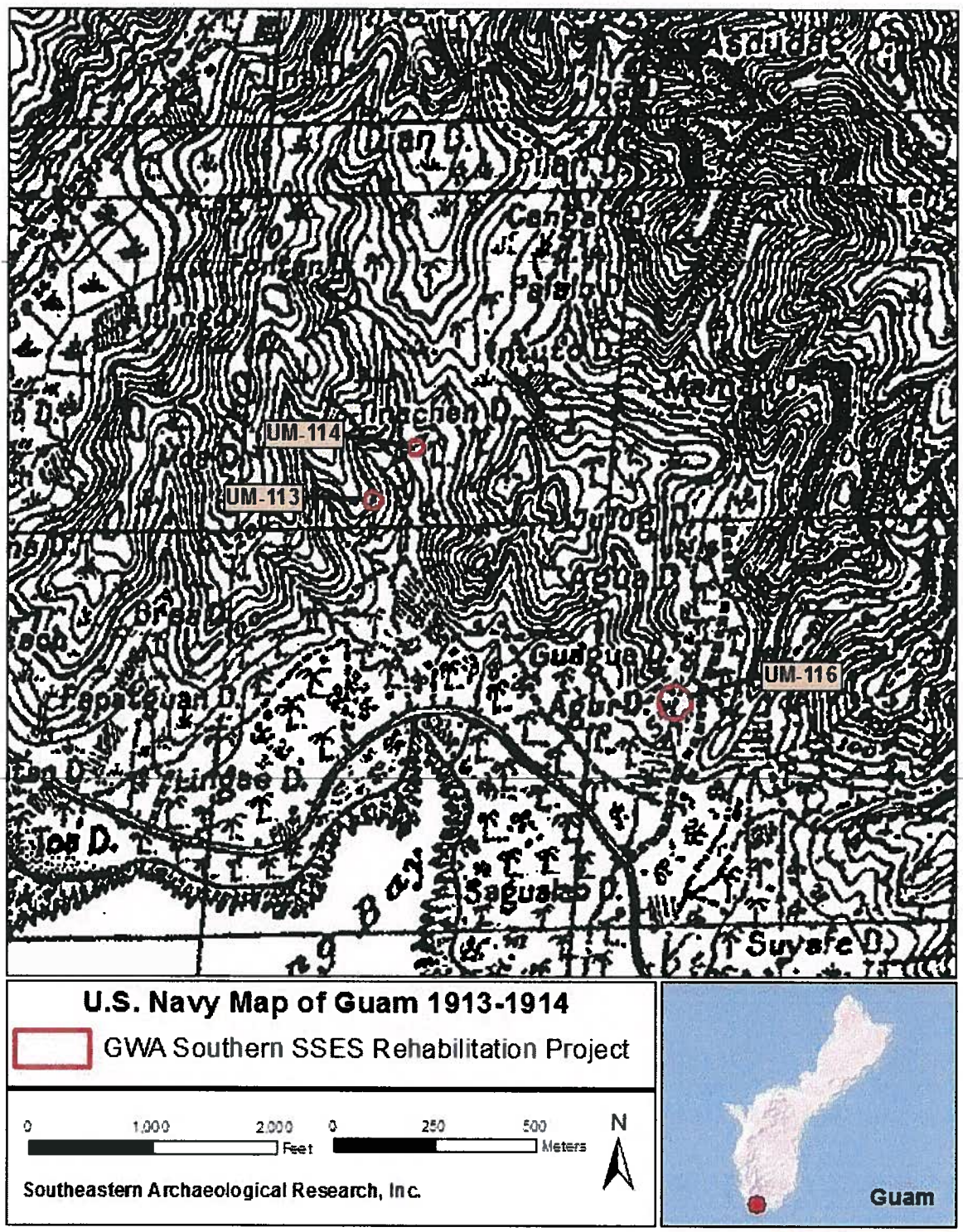


**Figure 17. Location of UM-113, 114, 116 on 1913–1914 map of Guam (Sturdevant 1914).**

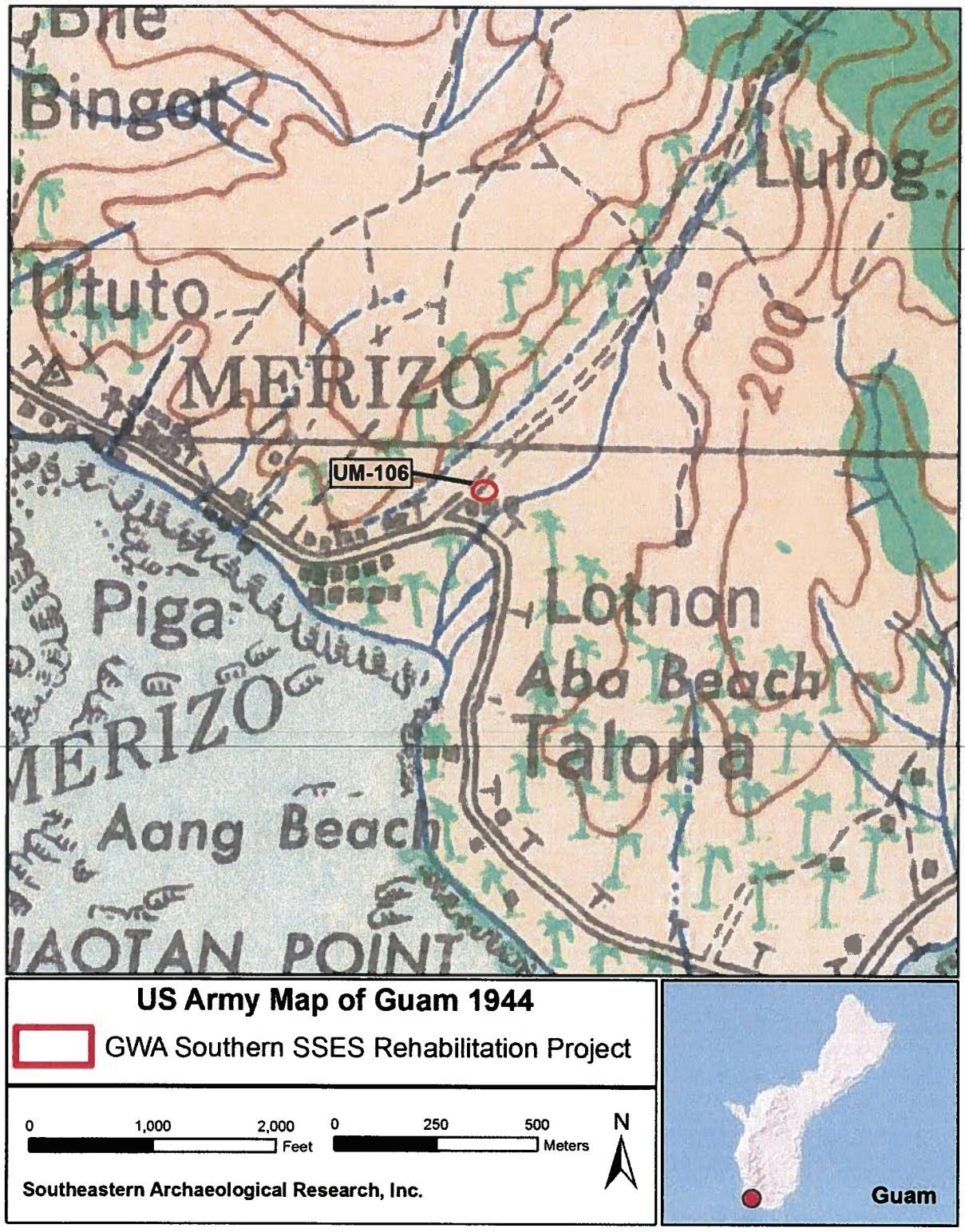


**Figure 18. Location of UM-106 on 1944 map of Guam (US Army 1944).**

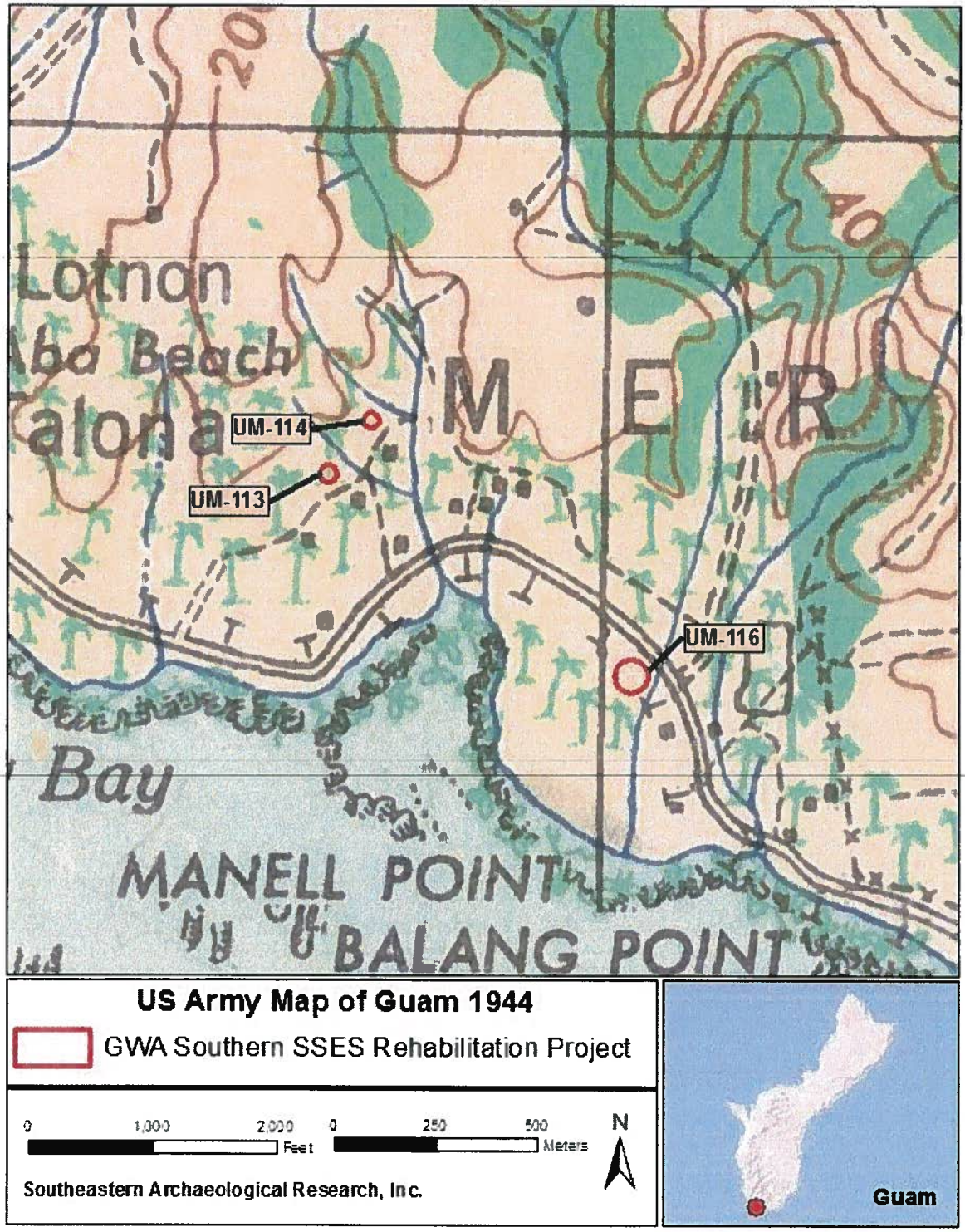


**Figure 19. Location of UM-113, 114, 116 on 1944 map of Guam (US Army 1944).**

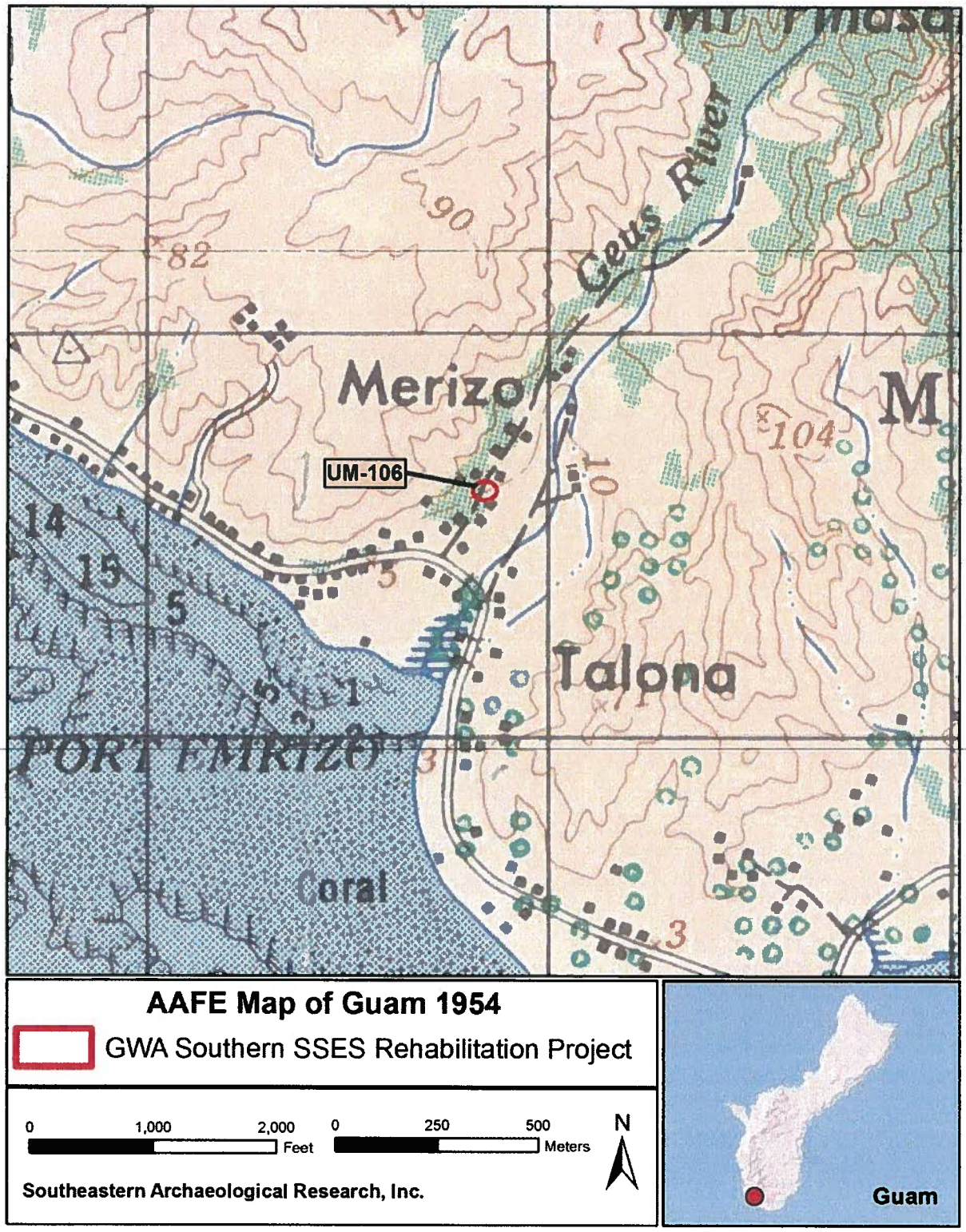


**Figure 20. Location of UM-106 on 1954 map of Guam (AAFE 1954).**

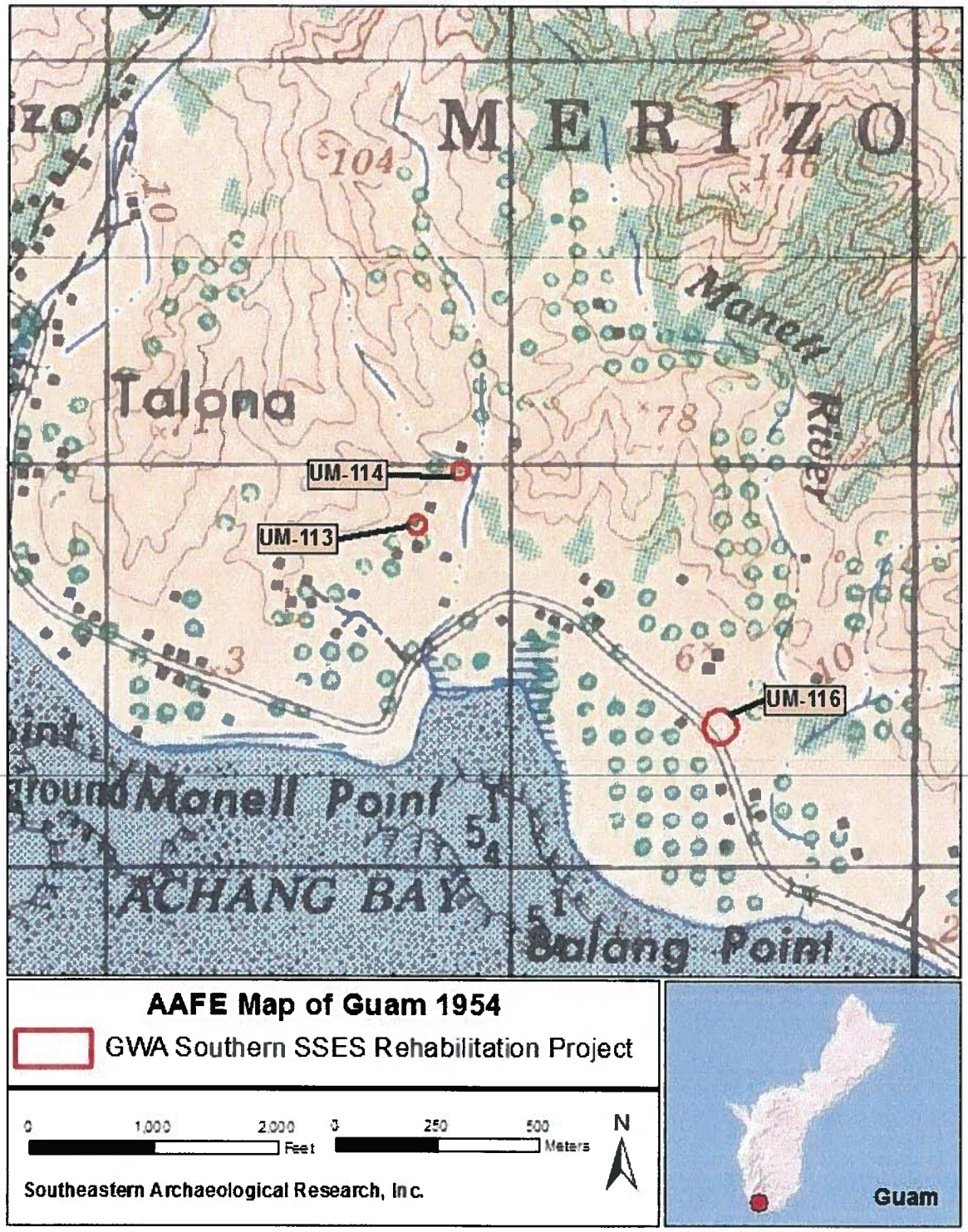


**Figure 21. Location of UM-113, 114, 116 on 1954 map of Guam (AAFE 1954).**

## PREVIOUSLY IDENTIFIED SITES IN AGAT-SANTA RITA

In the 1920s Hornbostel produced a map of Guam depicting latte sites and latte density within the sites (Reed 1952). This map illustrates latte structures all along the coastline between Facipi Point and the Orote Peninsula (**Figure 22**).

In 1987 Hunter-Anderson and Moore (1987) excavated three backhoe trenches in conjunction with the Inn on the Bay project located on the west side of Route 2, south of the mouth of the

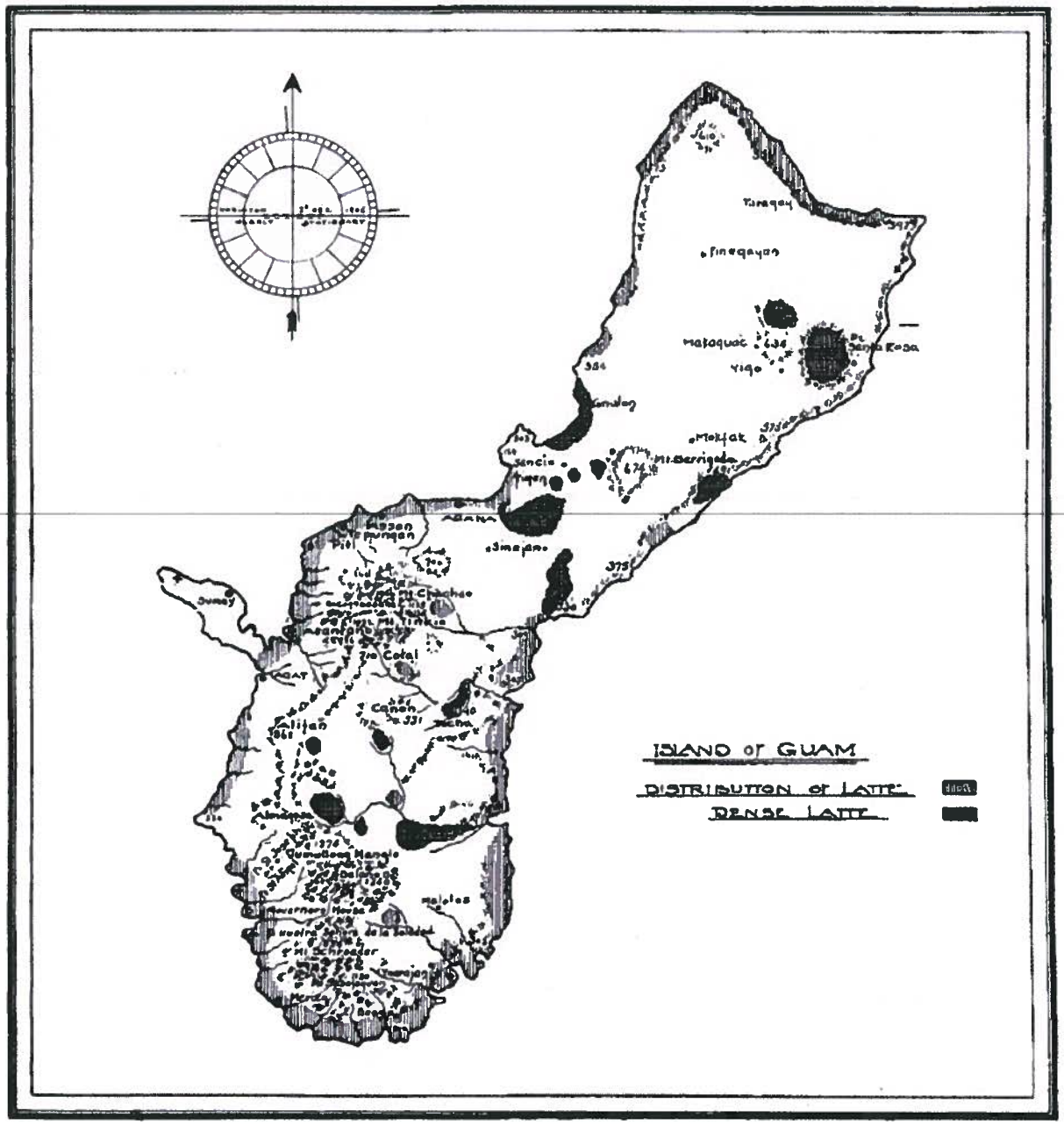


**Figure 22. Hornbostel's map of Guam (Reed 1952).**

Nama River. Two of these three trenches exhibited evidence of Latte period prehistoric occupation. A radiocarbon age determination of AD 895–1255 was derived from these cultural deposits.

Moore (1987) conducted an archaeological survey of Lot 238-1 in the Village of Agat. These investigations included excavation of soil cores and auger testing within the wetlands. No archaeological sites, features, or deposits were identified. Moore speculated that the wetlands within Lot 238-1 may have been converted to rice paddies during the World War II Japanese occupation of Guam.

In 1989 Micronesian Archaeological Research Services (MARS) undertook archaeological survey investigations in conjunction with Route 2 highway reconstruction between Agat and Umatac (Moore et al. 1989). It was concluded that construction of the road had likely destroyed prehistoric sites once located along the road corridor. A single latte set was identified outside of the reconstruction project right-of-way.

Hunter-Anderson (1989) undertook further subsurface testing in conjunction with the Agat Small Boat Harbor project located a relatively short distance south of the AG-115 project area. These investigations included four backhoe trenches and three shovel test excavations within two site areas previously identified by Price (1977) and Kurashina et al. (1987). These investigations suggested that prehistoric utilization of this area was limited to short-term lagoon exploitative activities and strand farming as opposed to intensive habitation. paleoenvironmental data, including pollen, soil, and radiocarbon analyses suggested changes in the landform over the last 1,000 years. These changes precipitated by tectonic uplift and increased erosion/alluvial deposition resulted in infilling of the lagoon and then the subsequent estuary environments.

In 1991 DeFant et al. (1991) undertook a pedestrian survey and backhoe testing of a 1.4 ha area in the Tumat area of Agat. These investigations identified a large surface scatter of prehistoric ceramics and an associated buried soil stratum exhibiting prehistoric features. One of the features yielded a radiocarbon date of 1,000 +/- 60 BP.

In 1994 Moore et al. (1995) conducted monitoring and data recovery investigations in conjunction with the Agat Santa Rita Waterline in Agat Village. Despite extensive disturbances attributable to the World War II battle and post-war construction, intact prehistoric features, deposits, and burials were identified within the utility trenches. All of the identified deposits and features were attributed to a Latte Phase or Historic Period occupation. These findings included the identification of an area interpreted as a fishhook manufacturing loci.

In 2001 Hunter-Anderson et al. (2002) identified a cluster of prehistoric human burials while monitoring a communications trench along Route 2 near the Route 12 intersection. A total of 13 burials as well as commingled elements representing at least four additional individuals were recovered. Associated features included four postholes. Overlying these Latte Phase

interments was a layer of dark brown clay containing a mixture of late Latte Phase and early Historic Period materials.

In 2006 PHRI undertook an archaeological subsurface survey of selected segments of the proposed Old Agat Sewer Collector 'A' and 'B' Project, Agat Village, Guam (DeFant 2007). These investigations involved the excavation of 27 backhoe trenches located throughout the southern portion of Agat Village, immediately north of the AG-115 project area. The archaeological backhoe testing investigations identified evidence of both prehistoric occupation/utilization and World War II American military activity within the project area.

In 2010 SWCA recovered the remains of nine Japanese soldiers from a mass grave located on South Santa Cruz Street in Agat (Walth et al. 2010). The full extent of this mass grave was never identified.

## PREVIOUSLY IDENTIFIED ARCHAEOLOGICAL SITES IN MERIZO

Hornbostel conducted the first known archaeological work on Guam in the 1920s and produced a map depicting latte areas with variable densities of latte structures (see **Figure 22**). This map illustrates a continuous distribution of latte structures all along Guam's southeastern coastline and for some distance inland.

Previous archaeological investigations have identified a series of extensive prehistoric habitation settlements along Guam's southwestern coastline. Many of these were first identified by Reinman (1966, 1977) during his low-intensity archaeological survey of Guam in 1965–1966.

The Achang Bay Site (66-05-0115) was recorded by Reinman along the west bank of the Manell River near Balang Point, and continues around Achang Bay to Manell Point. This site extends along the shoreline in proximity to the UM-106, UM-113, UM-114, and UM-116 project areas. The site contains prehistoric ceramics and stone and shell tools, as well as the remains of three latte structures. Artifacts associated with the Spanish occupation also were reported in the vicinity. Reinman postulated that this may be the site of the historical village of Pa'a.

According to Reinman, "Merizo Village from the Geuss [sic] Valley west to the present Merizo school is and was the location of a former village" (Reinman 1966). Extensive ceramic deposits were discovered in cleared areas along the beach and in the village. At the eastern edge of the village, a deep pit was located in which prehistoric ceramics could be seen in the sidewalls. Designated by Reinman as Site MaGMe-6, the site has been reassigned as GHPO Site 66-05-0116.

PHRI conducted a surface and subsurface inventory survey of the Cocos Island Resort Main Parking Facility in November 1990 (Henry et al. 1991a). Findings from this survey indicate a

portion of GHPO Site 66-05-0116 exists within the Main Parking Lot Facility project area and contains subsurface ceramics and cooking features dating to the Latte Phase of Chamorro prehistory. In addition, evidence of a Pre-Latte occupation also was noted in deeply buried, rapidly deposited soils. Pre-Latte ceramics were located in two intact strata of brown, sandy clay at a depth of 5.26 m below surface.

Prehistoric archaeological deposits have been documented on Cocos Island. In 1989, PHRI conducted a high-intensity, subsurface inventory survey of the Cocos Island Utilities Facility Renovation Project (Haun 1989). PHRI recorded subsurface prehistoric deposits as PHRI Temporary Site T-1, subsequently assigned GHPO Site Number 66-06-0349 (which refers to all prehistoric deposits on Cocos Island).

An additional survey of the northeastern two-thirds of Cocos Island was undertaken by PHRI in 1990 (Henry et al. 1991b). The survey employed surface examination and systematic subsurface testing. Although no cultural materials were documented on the disturbed surface, trenching revealed extensive, deeply buried cultural strata, of which the earlier PHRI find is a part. The site was recorded as a locally disturbed, deeply stratified, prehistoric deposit containing prehistoric ceramic sherds, marine shell, human remains, pits and fire-related features. Radiometric analysis indicated two periods of occupation: AD 1050–1300 and AD 1400–1700. Date ranges tended to overlap considerably. It is possible that the dates were affected by some degree of disturbance, thus bringing into question their reliability. Ceramics recovered supported a late Latte Phase occupation of post AD 700–1000. GHPO Site 66-06-1222, a *hot'no* or beehive oven, is located within the boundaries of the Cocos Island Resort Master Plan—Main Parking Lot project area (Henry et al. 1991b).

The Merizo Combento (GHPO Site 66-06-1067) is a structure which has been used as a rectory for the Catholic parishes of Merizo and Umatac since it was built in 1856. The only exception to doctrinal use was during the Japanese occupation during World War II, when the building was used as a prison. The Combento holds the distinction of being the oldest, continually occupied structure on Guam. Its location is adjacent to the Shrine of Our Lady of Sorrows in the village of Merizo. Although the building has been renovated several times, the original exterior walls still remain (Leon Guerrero and DeFant 2001). The Merizo Combento, as well as the Merizo Bell Tower (see below) are located approximately 700 m west of the UM-106 sewer replacement project area.

The Merizo Bell Tower (GHPO Site 1013) is located directly across from the Combento, 10 m northeast of Cocos Lagoon and 5 m southwest of Route 4. Originally recorded by Reinman in 1974, the structure also is referred to as "The Old Spanish Bell Tower." According to Reinman, "It was built in 1919 by Father Cristobal de Carals O.F.M Cap. Although the Bell Tower is quite recent, it is nevertheless a symbol of the Catholic Church's interest in and activity for the island" (GHPO 1974).

GHPO Site 66-05-0114 (MaGMe-4) is a 10,000 square m site located between the Liyog River Valley and the Manell River, near Balang Point. The site includes the remnants of a single latte structure, scattered prehistoric ceramics, and broken stone tools.

The Talona Site (GHPO Site 66-05-0117) was recorded by Reinman as a shallow midden with a large concentration of prehistoric ceramics on the eastern side of the mouth of the Geus River and Valley. Inland from the beach, a large rock was discovered which had a number of grinding surfaces. Reinman states that the rock had "a mortar hole on top and two areas that look like tool grinding or sharpening facets" (GHPO 1966). Artifacts dating to the Spanish occupation also were present in this area.

Kurashina examined the Talona Site in 1982 prior to the beginning of the Merizo Small Boat Harbor project by the US Army Corps of Engineers. He noted Pre-Latte Phase ceramic fragments at a depth to 0.66 m and evidence of Latte Phase occupation (Kurashina et al. 1982).

The Ajmo Beach Site (GHPO Site 66-05-0118) is located on a shelf above the beach between Bile and Toguan Bays. The site contains a dense subsurface midden deposit of ceramics, shell and stone tools, and other debris in a brown to black sand and sandy clay soil.

The Siligin Spring Site (GHPO Site 66-05-0119) is located on the banks of the Geus River at the head of the Geus Valley. The site contains a single, eight stone latte set and a sparse scatter of ceramics and midden.

The Geus Valley Site (GHPO Site 66-05-012) is located 400 m south of the Siligin Spring Site in the northern part of the Geus Valley. The site contains two disturbed latte, a dark midden of ceramics and stone tool fragments, and a mortar.

The Luluk Site (GHPO Site 66-05-0121) is located 500 m east of the Geus Valley Site on the other side of the Geus Valley. The site contained six columns that previously had been buried beneath about one m of soil. The columns were unearthed and removed by the landowner to expand agricultural fields. Reinman does not mention associated cultural deposits or artifacts.

GHPO Site 66-05-0122 (MaGMe-12) is located on Bile Bay approximately one-half mile north of the village of Merizo, on Bile Bay, in the area between the Bile and the Piqua rivers. The site contained an area of prehistoric ceramic concentrations, stone tools, marine shell, and midden debris.

# RESEARCH DESIGN

The following discussions outline the scope of the archaeological monitoring research, the research orientation relevant to the recovery and analysis of data, and methodologies to be employed during the archaeological monitoring and discovery investigations. The discussion of research orientation includes discussion of relevant research topics and the discussion of research methods includes reference to both field and laboratory methods.

## SCOPE OF ARCHAEOLOGICAL MONITORING

Archaeological monitoring will be conducted of all ground-disturbing excavations associated with the proposed construction of the GWA Southern SSES Rehabilitation Project. This will include excavations associated with the repair and replacement of sewer lines, as well as mechanical vegetation clearing or grading associated with the repair of sewer manholes.

The basic objectives of the archaeological monitoring fieldwork will be as follows:

- To identify and evaluate significant archaeological remains exposed within the project area;
- To notify the construction contractor, Project Management Team, and the GHPO upon discovery of any significant archaeological, historical, or cultural properties or objects;
- To evaluate the significance of identified properties or objects and determine the nature and extent of any data recovery and/or preservation measures to be implemented; and
- To carry out an appropriate level of recording (including plan mapping, profiles, written descriptions and photographs), collection of diagnostic and museum quality artifacts, collection of appropriate samples of ecofactual remains, including soil

In general, the archaeological monitor will closely monitor these activities and examine the exposed soil to recover and record any portable cultural remains unearthed.

In the event significant archaeological remains are identified within the project area, further disturbance will be immediately halted and the archaeologist will work to record and evaluate the exposed data as expeditiously as possible. The discovery of significant archaeological deposits or features will require consultation with the Project Management Team and the GHPO. The specific data recordation and recovery methods to be applied to discoveries during archaeological monitoring area specified in the Field and Laboratory Methods section of this Archaeological Monitoring and Discovery Plan.

# RESEARCH ORIENTATION

The following discussions outline the prehistoric and historic period problem orientations within which the significance of deposits discovered within the GWA Southern SSES Rehabilitation Project areas will be evaluated in terms of their ability to yield information applicable to timely and important research questions. It is this ability to address such research domains that qualifies archaeological sites for US and Guam Register of Historic Places nomination under Criterion D: information content. These research domains are of relevance not only to our understanding of prehistoric and historic occupation within the project areas, but may also be applicable to broader domains of cultural adaptation and change.

## Prehistoric Resources

It is anticipated that prehistoric cultural deposits or features within the GWA Southern SSES Rehabilitation Project areas will be evaluated and treated in accordance with site variables important to furthering our understanding prehistoric occupation within the vicinity of these findings. These site variables include the age of identified site deposits/features and the intrasite structure of the prehistoric settlement.

Investigation of the temporal dimension of site occupation or utilization can be considered a prerequisite stage of research contributing directly to our understanding of site context and the context of all subsequent analyses. In practice, the calculation of either absolute or relative age allows the site or sites to be placed within a larger chronometric or even evolutionary framework that has considerable influence on the evaluation of site significance and interpretation of findings.

Intrasite spatial analysis is derived from the aspect of settlement pattern studies that seeks to define the individual households or localized communities that form the basic building blocks of the larger cultural landscape (Trigger 1967; Willey 1956). On a theoretical or inferential level, intrasite spatial analysis seeks to reconstruct and explain past behavior and activities by defining the organization of functional artifact types into activity-specific assemblages and by defining the spatial limits of activity areas. Methodologically, intrasite spatial analysis seeks to detect patterning in the distribution of a single type or multiple types and to define the spatial limits of this patterning.

In the Marianas, where architectural features are present, intrasite habitation spatial analyses have for the most part focused upon the functional interpretation of individual architectural features, such as those comprising a typical residential site (e.g., latte structures, canoe houses, cookhouses, etc.). Within site contexts exhibiting limited architectural features, intrasite spatial analyses have focused upon food preparation areas, shell tool manufacturing areas, disposal areas, agricultural areas, and habitation areas as represented by classes of feature or artifact types (Moore 2005; Osborne 1947; Reinman 1977; Takayama and Intoh 1976).

## Historic Resources

Documentary sources relevant to the specific areas to be monitored as part of the GWA Southern SSES Rehabilitation Project are very rare and limited in scope. Consequently, the proposed monitoring and discovery investigations possess a potential for discovery of important information regarding the utilization of these areas during the colonial periods.

In addition to information regarding the historic period organization and utilization of the project areas, the GWA Southern SSES Rehabilitation Project monitoring and discovery investigations also have the potential for gathering important information regarding colonial period facets of everyday life for inhabitants. The discovery of structural remains related to residential houses may tell us much about how these houses were constructed, as well as their size and associated outbuildings. Material remains left behind by these residents can also tell us much about the dietary habits, relative wealth, status, ethnicity, and leisure activities of these people.

# RESEARCH METHODS

The following research methods involve archaeological monitoring fieldwork, discovery documentation and evaluation, consultation regarding discovery treatment, data recovery fieldwork, analysis of data, and preparation of reports.

## Archaeological Monitoring Fieldwork

The archaeological monitor will closely monitor all GWA Southern SSES Rehabilitation Project related ground-disturbing activities with a potential for impacting surface and buried cultural deposits/features. Where appropriate, soil exposures shall be troweled and examined for evidence of cultural deposition.

Archaeological monitoring will include the collection of all temporally diagnostic and museum quality artifacts unearthed and recordation of exposed features and deposits of potential prehistoric or historic period association. Recordation will include photographs, completion of standard feature record forms, scaled profile illustrations, and scaled planview illustrations.

Field documentation will also include recording the horizontal and vertical proveniences of recovered portable materials, subsurface features, and cultural strata encountered. The locations of all discoveries, including collected artifacts, will be accurately located utilizing a Trimble GeoXH 6000 series GPS instrument capable of sub-meter accuracy. All gathered GPS data will undergo post-processing. The locations of all such finds will also be marked on project plans.

## Archaeological Data Recovery

Archaeological data recovery measures will be implemented should identified archaeological deposits or features be evaluated as potentially significant. The significance of any archaeological remains identified within the project areas will be assessed in terms of both the US National Register criteria (36 CFR Part 60) and the Guam Register of Historic Places (GRHP). The definition of site significance under National Register Criterion D (Information Content) will be evaluated in reference to timely and important research domains, including, but not limited to those discussed within this Monitoring and Discovery Plan. As soon as possible following the discovery of a potentially significant resource, consultations will be initiated with Project Management Team and the GHPO regarding the determination of discovery significance and the specific data recovery and/or site preservation measures to be implemented.

Possible data recovery measures to be implemented include detailed recordation, controlled excavation of entire features, excavation of one square meter (or larger) controlled excavation units, and sampling of deposits or features. In regard to potentially significant historic deposits or features relevant documentary research and oral history research may be included to supplement the archaeological data.

Strict horizontal and vertical locational control will be maintained over all data recovery excavations. A permanent site datum will be placed in close proximity to all features excavated and controlled excavation units. Controlled excavation units, features, and analytic samples will be excavated using hand tools in arbitrary levels or natural stratagraphic units. In order to recover subsistence materials, particularly fishbone and macro-botanical remains, the soil matrix removed from all cultural features, controlled excavation units, and analytic samples will be sifted through 1/8-inch or smaller mesh. All screen residuum will be returned to the laboratory for sorting and analysis, in clearly marked and secure containers.

Field documentation of the data recovery excavations will include completion of standard archaeological excavation unit and feature forms. Plan view and stratigraphic section drawings will be made to scale, as appropriate. High resolution digital color photographs will be taken to document the fieldwork and to support the written and graphic record. All photographs will include a north arrow, metric scale, and sign board.

### Human Burial Treatment

Should human skeletal remains be encountered during the archaeological monitoring or data recovery investigations, these remains will be treated in accordance with the following procedures and methods.

Immediately following discovery of undisturbed human skeletal remains, further ground disturbance and construction in the immediate vicinity of these remains will be immediately halted and the Project Management Team and GHPO will be notified by the Principal

Investigator within 24 hours or less of such discoveries. If necessary, written information and photographs regarding the discovered human remains will be provided. Discovered human remains will be appropriately protected from exposure until a decision is made regarding their treatment. No human burials will be excavated without the concurrence of the Project Management Team and GHPO.

Should it be determined that identified human skeletal remains are to be excavated, the Principal Investigator will submit to the Project Management Team and the GHPO a detailed description of the methods to be utilized during excavation and analysis of such remains. No human burials will be recovered without the approval of the GHPO. The Principal Investigator will also ensure that consultations be commenced with the GHPO and interested parties regarding the community's preferences with regard to the reburial of any human remains recovered from the project area. It is anticipated that a reburial location close to the project area will be selected. Reburial will be in accordance with the amended Section IV of the Department of Parks and Recreation Guidelines for Archaeological Burials (GDPR 2010).

## Materials Analyses

Laboratory analyses of collected materials is an integral and important aspect of the proposed archaeological investigations. In accordance with the previously discussed research objectives, analyses will include chronometric and relative age determinations, ceramic analysis, and analysis of recovered non-ceramic artifacts. Analysis of recovered faunal and floral remains may be undertaken if such remains are deemed potentially significant. These principal areas of analyses are summarized below.

Analysis of the portable artifacts will be mainly descriptive, limited to identifying and cataloguing the artifacts according to inferred functional type. Analysis of human skeletal remains will be undertaken should such remains be recovered. A qualified osteologist will undertake all necessary human skeletal analyses in accordance with the Department of Parks and Recreation Guidelines for Archaeological Burials (GDPR 2010). A resume for the osteologist will be provided to the GHPO.

Ceramic analysis will include all prehistoric ceramics recovered. Analysis of recovered ceramics will focus upon defining the temporal association of the various deposits sampled. By this means, roughly contemporary areas can be evaluated in regard to variable patterns of site structure. Should sample size be sufficient, an attribute analysis shall be conducted on recovered sherds. The seriation of ceramic attribute types into a sequential chronology is a particularly useful means of assessing chronological relationships in the Marianas (Moore 1983, 2002). Further compositional analysis of ceramic temper and paste may also be undertaken. Such analyses may include petrographic analysis of temper and microanalysis of clay/paste.

Radiocarbon assay provides an estimate of the absolute age of materials analyzed, subject to the limitations of the sample under study. Wood charcoal provides high-quality radiocarbon dates, but it often is not found in significant amounts in the region. Where necessary in the

cases of very small or diffuse samples, extended counter time and/or an accelerated (AMS) method will be used. Samples for radiocarbon analysis will be submitted to a commercial laboratory for processing.

Analysis of the faunal material recovered from the project areas will be directed toward definition of the prehistoric subsistence economy and questions related to site function. Faunal analysis will include identification of invertebrate (primarily malacological) and vertebrate (mammals, reptiles, amphibians, birds, and fish) remains. Malacological analysis will include identification of the range of marine, littoral, and terrestrial taxa present. Quantitative methods applicable to recovered faunal shell collections may involve summary statistics, proportional frequencies, Concentration Indices (CI) for areas within the project area, ubiquity analysis, and diversity indices.

Analysis of non-human vertebrate remains will include identifying the range of taxa present. Fish remains, which constitute the bulk of non-human faunal remains in Pacific Basin sites, are not only indicative of past environments, but also of prehistoric fishing activities. Fish characteristic of lagoon, reef, or pelagic environments require very different fishing strategies and technologies for their capture. These remains, in conjunction with any fishing-associated artifacts from the site (e.g., hooks, lures, net sinkers), may provide valuable information concerning the importance of fishing to the site's past inhabitants. Reptilian, amphibian, avian, and mammalian remains are likewise useful in revealing not only past human food gathering activities, but environmental conditions as well. Quantitative analysis will consist of summary statistics, with specialized analyses such as MNI (minimum number of individuals) and meat/body weight estimations dependent upon the extent and degree of preservation of the assemblage.

Paleobotanical analysis will include the identification of charred plant macroremains recovered from dryscreen, soil samples, and ceramic sherds. Analysis will determine not only the range of plant taxa present, but also the presence of prehistorically important economic (food, fuel, and construction) plants, as well as plant taxa that are indicative of prehistoric environment. Quantitative methods will include summary statistics, developing CI for areas within the project location, and ubiquity analysis of all taxa to compare frequencies of occurrence and relative importance of identified taxa. Additional quantitative methods may be used depending upon the size and integrity of the paleoethnobotanical assemblage.

GPS data will be incorporated in a comprehensive Geographic Information System (GIS) using ArcGIS version 9.3.1 software. All GPS data, shapefiles, and other information in the GIS will be included in a geodatabase. These data will include corresponding attribute information, with a separate explanation of all field headings. Metadata on the method of collection, accuracy of data, and contact information will be embedded in the GIS files.

## Report Preparation

The results of fieldwork and analysis conducted in accordance with both the monitoring and data recovery measures specified above will be included in draft and final technical reports to be submitted to the Project Management Team and the GHPO for review. An artifact catalog that includes all of the material collected will be included in the draft and final reports. If site deposits or features are identified, Guam Historic Properties Inventory Data Forms will be completed.

All recovered artifacts and all associated records, including field photographs, original notes and maps, GPS data, and complete GIS data, will be prepared for curation in accordance with federal standards and transferred to Guam Museum.

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